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ORIGINAL ARTICLES.

DIPHTHERIA: ITS CAUSE AND TREATMENT.[1]

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THE almost constant prevalence and the unmitigated fatality of diphtheria make it a subject for the consideration of which no apology is necessary. It is as constant and important a factor in our mortality reports as is consumption or typhoid fever, and yet, notwithstanding the frequent opportunities to study it, there still exists some uncertainty as to its mode of origin. Does it originate in the local lesion, or is the local lesion a result of the systemic affection? In considering this question we must remember that the lesion may and often does exist elsewhere than in the fauces, sometimes making its appearance there as one of the later manifestations, and occasionally altogether failing to appear. The original local lesion may exist in an unobserved portion of the nares or larynx, and being for some days uninterfered with, the systemic disease may manifest itself prior to the discovery of any lesion in the throat. Such a case would *appear* to prove the secondary character of the faucial exudate, but it can by no means be held to prove the systemic origin of the disease, especially since we know not only that a local lesion *may* exist for days without the occurrence of any constitutional symptoms, but that it is occasionally, though rarely, the only manifestation of the disease. The weight of evidence seems to be in favor of a local origin, and the apparent preference for the nose and fauces is most reasonably explained by the hypothesis that the germ is usually inhaled or swallowed, and is, of course, more liable to find lodgement there than at any other point. Then, too, abrasions of the mucous membrane in this locality are of frequent occurrence and offer a favorable spot for germ-lodgement and growth, while the rich lymphatic supply of the throat provides an open avenue for systemic infection. In connection with this we know that children who are catarrhal seem to be especially susceptible to the disease, and that in them it is apt to be of a severe type. The predilection which diphtheria seems to have for certain families may be explained by the fact that those families are catarrhal, *i. e.*, every member of the family may have susceptible mucous membranes, not of the nose and throat alone, but also of the digestive and genito-urinary tracts. I have more than once observed the coincidence of this susceptibility with the occurrence and recurrence of a peculiarly malignant type of diphtheria.

The cause of diphtheria is at present very generally supposed to be bacterial, but whether the bacteria themselves, or the ptomaïnes resulting from bacterial life and growth, are the cause is not yet determined. Several investigators claim to have isolated the specific bacillus, or coccus, as the case may be, and each one is morally certain that his is the morbific agent. The Klebs-Löffler bacillus and the streptococcus diphtheriæ of Prudden seem to have a more definite relationship to the disease than have any other microörganisms yet isolated, and it is possible that both forms may have a connective relation to similar necrotic processes, the clinical phenomena resulting therefrom being identical.

This supposition is not entirely hypothetical, but, on the contrary, is entirely in accord with the general trend of late bacteriological investigations. For example, certain forms of pleurisy are plainly of a non-microbic origin, being dependent on rheumatism, plumbism, or similar conditions causing chemical changes in the blood, while the microbic variety may be due to the presence of anyone of a number of microörganisms — among those which have already been found being the tubercle bacillus, the typhoid fever bacillus, the streptococci, the staphylococci, and the encapsulated diplococci of Fränkel.[1] A very interesting suggestive fact in this connection is that the streptococcus diphtheriæ of Prudden[2] seems to be identical with the streptococcus erysipelatous and the streptococcus pyogenes, varieties of micrococci with which bacteriologists have been familiar for some time. This identity is proven, not simply by morphological resemblances, but by a series of biological and chemical tests and control experiments. This discovery points to an explanation of the oft-noted clinical relationship of diphtheria, erysipelas, and scarlatina. However close may be the primary causative relationship of the coccus to the disease, there ensue during the pro-

[1] Read before the Denver Medical Association and Arapahoe County Medical Society, December 18, 1890.

[1] Third Italian Congress of Internal Medicine. THE MEDICAL NEWS, December 13, 1890.

[2] American Journal of the Medical Sciences, April and May, 1889.

gress of the disease certain pathological changes with which the coccus does not seem to be intimately concerned, as well as the immediate changes of which it may undoubtedly be considered the exciting cause.

Locally the pathological changes occur in the following order: ulceration and modification of epithelial cells, migration of leucocytes, and exudation of fibrin and lymph. Constitutionally, the disease manifests itself as a malignant, disintegrating, and degenerating force acting upon the blood, which it probably reaches indirectly through the medium of the lymphatics. There is a manifestly increased tendency to fibrin formation as evidenced by the character of the faucial membranes as well as by the exudates which occur in any portion of the body where a synchronous inflammation or injury exists. There is also an influence exerted which disintegrates the red blood-corpuscles, or failing in that, interferes with the performance of their functions as oxygen-carriers; thus lowering vitality, retarding nutrition, and preventing the proper elimination of waste products. It is asserted that bacteria cannot exist in living, active, circulating blood, and if this be so, then the hæmatic changes just described cannot be due to the *immediate* action of the so-called diphtheria germs, but *may* be due to the chemical affinity of their ptomaïnes for the hæmoglobin of the red blood-corpuscles.

So much for the theoretical pathology of the diphtheritic processes, a problem still enveloped in more or less uncertainty. But it seems that modern investigation is daily approaching more closely to the solution, and we may soon expect to appreciate definitely the true nature of this the most horrible of modern contagious diseases, and to gain from that knowledge some indication as to the proper treatment, perhaps even a revelation as to its absolute prevention.

It is unnecessary in a paper of this character to dwell upon the symptomatology and course of the disease, that being a subject with which every practitioner is only too familiar.

In regard to fatality, it has been my experience that different epidemics seem to vary—one year the major portion of all the cases recover, the next year the majority die, and this occurs irrespective of the treatment adopted. It is a general rule, however, that the severity of the case depends on the extent of the membrane and the rapidity of its formation. Of cases in which the tonsils only are involved, we rarely lose more than 10 per cent. If the nose and palate are involved, about 50 per cent. die; if the larynx only is invaded, 75 per cent. die; while if the nose, fauces, and larynx are all invaded, at least 90 per cent of the cases will be lost.

The occurrence of temporary paresis as a sequel of diphtheria is a very common event, possibly the soft palate is most often affected, although in my own experience strabismus has occurred about as frequently as paralysis of the palate. The vocal cords and the peronei muscles of the leg come next in frequency of involvement, while multiple paralyses and general paresis are infrequent. The patients generally recover from local palsies, with little or no medication, although general tonics and electrical stimulation are never out of place.

I have twice seen beginning anterior spinal curvature as a sequel of diphtheria: in one case in a girl of twenty years at the second lumbar vertebra; in the other at the cervical region in a girl of six years. Sayre's plaster-jacket and the "jury mast" —with the preparations of iron, the phosphates, and cod-liver oil internally—arrested its progress in both cases. I have never had permanent paralysis in any of my own patients, although, no doubt, it sometimes cannot be avoided. The number of such cases would be very much diminished if all cases of diphtheria were kept under surveillance and treatment for some time after recovery.

Suppuration of lymphatic glands, especially of those of the neck, is a sequel of somewhat frequent occurrence, and should be treated upon the same general principles which apply to such suppuration occurring under other circumstances.

Differential diagnosis. — There are only a few conditions liable to be confounded with diphtheria by competent observers. When a membranous exudate accompanies the angina of scarlatina the conditions resemble those of diphtheria so closely that an error in diagnosis may well be excused, especially if the scarlatinal rash happens to be suppressed. Indeed, we may well ask whether the pathological conditions present are not exactly similar in both cases, and the query comes with additional force when we remember that Prudden has found the same streptococcus present in scarlatina, diphtheria, erysipelas, septic pneumonia, and simple phlegmonous inflammations. He suggests that its action may be modified and its virulence diminished by the chemical constituents present in the secretions under varying conditions. Whether this can be proven we do not yet know, but there is certainly enough positive knowledge to enable us to assert the close relationship, if not absolute identity, of the pathological processes in the two diseases. Clinical evidences of this relationship occur with great frequency. I may cite the following:

A family moved to a short street which for a year had been absolutely free from diphtheria, and from scarlatina for three years. The house into which they moved was new and had never before been occupied. Their infant child, a year and a half old, was suffering from scarlatina, which fact they

suppressed and as soon as the child had recovered they moved away without disinfecting the sickroom. As soon as the house was vacated, the children of the neighborhood went into this room to play, and in less than a week four of them were prostrated with a severe type of scarlatina. Every one of the four had been in the room. On the fauces of one of them an exudate appeared, and the rash in her case did not make its appearance until about the tenth day of her illness. When this child recovered she was allowed to keep a doll with which she had played while ill, and the doll in a few days passed into the possession of the children of a neighbor all of whom had suffered from scarlatina three years before. Three of these children were then seized with diphtheria, the membrane invading the nose in all, and in one extending into the larynx, with fatal results.

Being fully conversant with every circumstance of these cases, all but two having been under my personal care, I am certain that no other source of contagion existed, and that the last patients contracted diphtheria from the antecedent cases of scarlatina.

A less dangerous affection, which is often pronounced to be diphtheria, but which, as a rule is promptly recovered from, is ulcerative follicular tonsillitis. The infectious character of this disease and the slight resemblance of its muco-purulent exudate to the fibrinous exudate of diphtheria, may readily cause a mistake if the examination is superficial, but if the examiner takes the trouble to mop off the secretion with a little absorbent cotton fastened on a probe, the resemblance disappears. An actual mistake in discriminating between this condition and that which characterizes diphtheria, is of rare occurrence; but a great many practitioners, especially those of the homœopathic persuasion, prefer to call such cases diphtheria.

It will be noted that I have not thus far used the word "croup," and for this omission there are several reasons, viz.:

Croup is not properly the name of a disease, only a *symptom* which may occur in connection with any form of laryngitis, or as a simple reflex act. I can conceive of no tangible reason for dignifying a symptom by calling it a disease simply because it occurs when the diphtheritic process originates in the larynx or happens to invade it secondarily.

W. W. Johnston[1] insists that he has many times made post-mortem examinations of children who have died of what he calls "true croup," and that he invariably found the larynx filled with a fibrinous membrane, but that *no* ulceration was present. This last fact he regards as pathognomonic; if ulceration is present it is diphtheria, if ulceration is absent it is "true croup," which, he alleges is never contagious. If this be so, then the inoculation of healthy animals with material from the "true croup" membrane will be innocuous; but if the advocates of "true croup" have in late years attempted to substantiate by experiments their assertion of the non-contagious character of the disease it is not generally known.

On the other hand, those cases which are claimed to be typical examples of "true croup" almost invariably accompany or are associated in some way with diphtheria, and such invariable association can only be explained by the supposition that the two diseases are identical.

Fatal cases of croup usually occur in families or localities where diphtheria is prevalent. Non-fatal cases of croup are usually of that variety which finds the patient perfectly well one day, very sick the next day, and perfectly recovered on the third, thus giving rise to the suspicion that the medical attendant had applied the name of true or membranous croup to a case of catarrhal laryngitis, laryngismus stridulus, or hysteria of the larynx.

To my mind, the "membranous croup" of the books is a process, the pathology, clinical appearance, and treatment of which are absolutely identical with those of laryngeal diphtheria, the name croup is a misnomer, and its study as a separate disease has been a mistake, due to the idea that the epithelial surface remains intact in croup, although as Billroth states,[1] the remainder of the pathological processes may be "exactly similar."

Rindfleisch,[2] however, states emphatically that "croupous inflammation is preceded by a loss of epithelial covering," . . . . "the most frequent agent being unquestionably the action of cleft fungi," that being the class name under which he includes all bacteria.

The non-contagious character of croup is not so generally admitted as it once was.

Perfect fairness demands the statement that some of the best pathologists still insist upon the non-identity of croup and diphtheria; and Prudden, while an advocate of their identity, calls attention to the fact that in the investigation of twenty-four cases of diphtheria he failed to find the streptococcus in two cases, one of which had been pronounced by the attending physician to be "croup and not diphtheria." The patient, however, died, and within a few days another child in the same family became fatally ill with all the constitutional and local evidences of *diphtheria*, and "*the streptococci were found*, not only in the membrane, but in the viscera."

Another disease which may occasionally be mistaken for diphtheria, is that variety of putrid sore-

[1] American Journal of Obstetrics, September, 1888.

[1] Surgical Pathology, p. 312.

[2] Elements of Pathology, p. 34.

throat, which also affects the palate, causing œdema of the uvula and in extreme cases sloughing of the parts. Practically this is a phlegmonous inflammation, and if neglected or if the history is not known it may closely resemble diphtheria, but a few days' observation and treatment will, as a rule, clear up the matter, especially since such cases usually occur in adults.

I have seen one peculiar case in a man twenty-four years of age, in which a patch of membrane closely resembling the membrane of diphtheria, covered the tonsil of one side for about two weeks and seemed to defy treatment, although it did not extend. The patient was tubercular and I concluded that it was a tubercular ulceration. Some months later an unexpected discovery in regard to his degraded personal habits, led me to believe that it was of syphilitic origin, and in all probability an initial lesion.

Treatment.—The methods of treatment recommended for diphtheria are many. From time to time there arises an apostle of some new, or the resurrector of some old plan of treatment, who will laud his method to the skies, claiming for it invariable success and for *himself* the infallibility of an all-wise physician. Such men and measures rarely, I might say, never hold their own during two successive epidemics.

While it seems improbable that we will ever discover a remedy which will cure diphtheria as quinine cures malaria, yet it is by no means improbable that in the near future a method of inoculation will be discovered that will materially lessen the frequency of its occurrence or perhaps entirely eradicate the disease.

In the present state of our knowledge, however, it seems wise that we should map out a line of treatment by classifying certain morbid conditions which usually accompany or result from diphtheria, and that we should then, upon general therapeutic principles, combat these conditions or destroy their causes by the use of the most potent remedies in our materia medica. This may lead to multiplication of remedies, but it allows the widest latitude for the exercise of the discretion of individual practitioners, as well as for the adaptation of remedial measures to the idiosyncrasies of individual patients. It is a rational plan, and at least as successful as any other now in vogue. Treatment must be general and local. In considering the indications for general treatment we find that there are four, as follows:

1. Diphtheria is essentially a debilitating disease; it wears out the heart and it shatters the nervous system. If the patient does not die from any other cause he will die from heart-failure or nerve-fag; hence it is important that from the first he should receive positive and persistent stimulation and nutrition to the utmost limit of his capacity. The stimulant should be a diffusible one, prompt, efficient, and reliable. There is one remedy only that will answer all these requirements, and that is *alcohol.* It may be given freely from the beginning of the disease, and with greater frequency and in increased quantity as the circulation demands it. It is useless and foolish to administer it in small quantities. If we wish to have its beneficial action it must be administered freely and steadily. Brandy, whiskey, champagne, or sherry may be used, as the exigencies of the case may require. I have given as much as twelve ounces of whiskey daily to a child four years of age, and had good results. If at any time a more potent and diffusible stimulant, which is at the same time as safe as alcohol should be discovered, I believe it will take its place in the therapy of diphtheria. Digitalin, strychnine, strophanthus, caffeine, camphor, and musk, may be indicated in many cases as adjuvant stimulants, but none of them can supplant alcohol, though they render very efficient service in combating special conditions.

2. Diphtheria is a septic disease, and to antagonize and defeat the septic process the most powerful antiseptic agents must be used. That here, as elsewhere, there may be a variance of opinion as to the most available antiseptic for this particular purpose is by no means surprising. Peroxide of hydrogen, carbolic acid, sulphurous acid, sulphur, eucalyptol, thymol, and the soluble mercuric salts have all their ardent advocates, and all are, no doubt, useful. My personal experience has been favorable to the use of corrosive sublimate on account of its energetic antiseptic action, the smallness of its dose, and its complementary action, of which I will speak further on. A child of six years may be given at first $\frac{1}{80}$ of a grain every two or three hours, and this may soon be increased to $\frac{1}{15}$ or $\frac{1}{10}$ of a grain without ill effects. This dosage may be continued for many days, or even weeks. I have usually given calomel at the same time, and although the total dosage has been in some cases enormous, I have never seen any indications of mercurialism, and what is more to the point, the cases have been favorably modified as to malignancy, duration, and termination.

3. A third indication, which is purely hypothetical, is the supposed tendency of the blood to the formation of fibrin, and for the purpose of counteracting this tendency I am in the habit of giving large and continuous doses of calomel, its action in this matter being assisted by the coincident administration of the corrosive sublimate. The favorable results which so often follow this dosage seem to render the hypothesis more tenable, and while I do

not attempt to explain the process, I recognize the results, and accept them as a sufficient reason for the practice. Under this medication extension of membrane ceases, and the exudate becomes less tough, and hence more easily removed and expectorated, the whole aspect of the patient improving at the same time.

It is to be noted that in diphtheria calomel not only does not salivate, but it has little effect as a cathartic. Why this tolerance should exist we cannot tell, but that it does exist is indisputable.

Some observers have even made it a diagnostic rule, stating it thus:[1] *if moderate doses of calomel produce characteristic stools, the disease is not diphtheria.* My own experience has been somewhat in accord with this, but I do not affirm its uniform application. I have given from 2 to 5 grains of calomel every two hours until the bowels moved, and have observed the movements to be natural in form and consistency when even 40 or 50 grains had been taken. To one apparently desperate case, a boy four years old, I gave 160 grains in three days, with the following results: (1) the bowels moved naturally once a day; (2) the tongue cleaned off and appetite returned; (3) the membrane ceased to extend and began to liquefy, the case progressing favorably from this time on to ultimate recovery.

4. A fourth indication to be met is the disintegration of red blood-corpuscles. We as yet know of no more reasonable method of meeting this indication than by the administration of some preparation of iron. The experience of American physicians seems to justify the use of this remedy quite as positively as the pathological conditions demand it. The tincture of the chloride is the form generally given, in doses of from five to twenty minims, every two or three hours.

These four indications cover the customary demands for the internal medication of diphtheria. I usually prescribe the tincture of the chloride of iron and the corrosive sublimate together in some pleasant menstruum, such as glycerin or syrup of orange, followed by a full dose of whiskey; the calomel should be given from the very first until the bowels are moved once or twice, and afterward repeated, as may be necessary, for that object and for the limitation of membrane formation. It is well taken if administered in the form of tablet triturates dissolved in a little milk. The dosage must, of course, be varied as the exigencies of the case demand, but it must always be borne in mind that in no other disease is medication so absolutely necessary or so well borne, and that to be efficient it must of necessity be heroic. It is probable that under this treatment there are at least twice as many recoveries as under an expectant plan of treatment.

[1] J. C. Lange, 1889.

From time to time, in the last decade, and even within the current year, ardent advocates of the calomel treatment have made for it extravagant claims, to which its more conservative friends can by no means give their assent. Calomel does not and cannot cure all cases of diphtheria. There is no known medication which can achieve such results, and the boastful claimants of such success have, perhaps unconsciously, suppressed all mention of their failures and recorded only their successes. Then the advice to administer calomel without regard to the patient's general condition, until the passages resemble frog-spawn stools, which twenty years ago might be pardoned to Dr. Reiter[1] in his enthusiasm over the revival of an almost forgotten therapeutic method, is at this date, to say the least, exceedingly unwise.

Local treatment aims to do two things:

1. To destroy the disease-germ and render its ptomaïnes inert.

2. To cause softening of the membrane and ultimately its complete removal.

The first object is sought by the application of antiseptic powders, washes, sprays, and gargles. A favorite application with the laity is powdered sulphur, and it has been asserted to be the cause of many marvellous cures. Professional experience with it has, however, not been very satisfactory.

Occasionally, when the original lesion is seen at an early stage, and has not yet attained a large size, it has cleaned off, healed promptly, and been followed by no constitutional disturbance after thorough cauterization with nitrate of silver, carbolic acid, or a strong solution (1 to 50) of corrosive sublimate.

In the nose it is said that the progress of the membrane may be arrested by tamponing the nasal cavity with cotton soaked in a 1-to-100 solution of sublimate, the tampon being renewed every hour.

Spraying or syringing the throat with a 1-to-1000 or 1-to-2000 solution of corrosive sublimate, or 1-to-30 solution of carbolic acid has been of much service. One patient of my own, whose nose, fauces, and larynx were simultaneously invaded, recovered after three weeks of hourly syringing with a 1-to-30 solution of carbolic acid.

Either lime-water as a gargle, or the vapor of slaking lime as an inhalation every half hour, is a most useful adjuvant to our local treatment. After every such application and the use of the spray the patient will expectorate shreds of membrane, and respiration will become easier.

To soften the membrane all the digestive ferments have been made use of, and all are highly efficient. To be efficacious a sufficiently strong

[1] Diphtheria; a monograph. By W. C. Reiter. J. B. Lippincott & Co., Philadelphia, 1878.

solution should be brought thoroughly in contact with the membrane. An alkaline menstruum, such as lime-water or soda-water, is most efficient, and it is not wise to use the ferments in the same solution with corrosive sublimate, since it will materially lessen, if not altogether destroy, their activity. It is better to use them alternately, fifteen or thirty minutes apart.

Moist air, or air saturated with steam, is an adjuvant by no means to be despised. The arrangement known as the "croup kettle" is worthy of trial in every case.

If local applications are to be of any service they should be used frequently and thoroughly. The patient should not be allowed to sleep past the time for the inhalation or spray, but as long as the case is dangerous one or the other of these should be used every half hour, or oftener if very urgent. Not until decided improvement is noted should the interval be increased, and then only with considerable caution. They should be kept up at intervals of two hours or less until every vestige of membrane has disappeared.

As there is great danger of sudden cardiac failure at any time during the course of diptheria, the patient should be prevented from doing anything that will cause an extra effort of the already weakened heart. Cases are not infrequent in which sudden exertion has been followed by instant death.

The operative treatment of laryngeal stenosis is a subject important enough to demand a special paper. My own experience has been limited and disastrous, but I firmly believe that early operation in properly selected cases will prove more successful in the future than in the past. Whether the operation should be intubation, laryngotomy, or tracheotomy, will depend, in a very large percentage of cases, upon the personal predilections or experience of the operator, with this exception that intubation will more often gain the consent of the parents because it is not a "cutting" operation.

Tracheotomy is an operation never to be undertaken lightly. Many writers underrate its difficulties, but the majority of operators will concede that it requires better judgment, more experience, and greater skill than any of the more frequently performed capital operations. The proper performance of intubation requires even a higher degree of skill, and should rarely be undertaken except by an operator who has practised it frequently and successfully upon the cadaver.

DISCUSSION.

DR. AUSTIN G. CASE, in opening the discussion, said that although diphtheria may be local in its origin, the physician is seldom called to see a case before the constitutional symptoms have manifested themselves. In treatment the medication which has given him the best results in one series of cases has frequently failed to benefit in another series, and under such circumstances the practitioner is ready to grasp at anything that seems to offer any chance of success. He has used nearly every form of medication that has been recommended, and has never yet found any remedy that proved to be a specific for diphtheria. In the first stages he has found calomel extremely beneficial, but cannot agree with the theory that it does not produce the characteristic stools in cases of diphtheria. It is his rule to push its administration until such stools do appear, and it may then be diminished, discontinued, or replaced by the bichloride of mercury. As a solvent to the membrane, no application has been so uniformly useful and reliable as the peroxide of hydrogen, and having this remedy, he can conceive of no reason for using other local applications which are much less efficient.

In regard to the operative treatment of laryngeal stenosis, he said that his personal experience with tracheotomy has been disastrous. In his own operations and in the many at which he has assisted, he has never seen a case of tracheotomy for diphtheria recover. Intubation has given him much more satisfactory results, since in a total of fifteen operations he has had five recoveries.

DR. H. B. WHITNEY said that the cause of diphtheria is now generally conceded to be the bacillus first described by Klebs and afterward by Löffler. It has been found that inoculation of this bacillus in animals will invariably cause diphtheria. Some recent investigations seem to show that the constitutional symptoms are due not to the bacilli themselves, since these cannot exist in the blood, but to some of their products, which are not, however, ptomaïnes, but closely analogous to proteids. The injection of these proteid products almost uniformly produces the constitutional symptoms of diphtheria, without, however, causing any formation of membrane.

DR. ROGERS was very strongly inclined to believe in the existence of croup and diphtheria as entirely separate disease-processes. Membranous croup is certainly not contagious as is diphtheria, and in illustration of this fact he cited the following incident: A case of croup in a large asylum was, upon the advice of the visiting medical staff, allowed to remain in the centre of the ward with the other children, no precautions being taken to prevent contact. There were no new cases either of croup or of diphtheria. He believed that such instances prove the non-contagiousness of croup.

DR. PFIEFFER described a case in which a temperature of 103°, pulse of 160, and respiration of 40, with a coincident endocardial murmur seemed to indicate an idiopathic endocarditis, but twenty-four hours later a diphtheritic membrane made its appearance in the throat. This case he regarded as one in which the disease was primarily constitutional, the membrane in the throat being a secondary manifestation.

He also described a case of croup in which he performed tracheotomy, and which came very near terminating fatally on account of extension of the membrane below the end of the tracheal tube. He believes in the employment of longer tubes than those generally employed, and thinks that their use would save many

lives, by giving the patient the chance afforded by the self-limitation of the membrane after it has proceeded a certain distance in the trachea.

DR. N. WEIST called attention to the efficacy of peroxide of hydrogen as a solvent and antiseptic, claiming that its use renders unnecessary the employment of sprays of corrosive sublimate. He asked for the experience of others in reference to suppuration of lymphatic glands, since his personal experience has been that it is infrequent.

DR. BRYANT said that in several epidemics he had seen suppuration comparatively frequently—in about 10 per cent. of cases. He called attention to the value of chloride of iron as a local application. It is an important point to bear in mind that strong local applications may destroy the healthy mucous surface and give an opportunity for extension of the membrane. Indeed, in at least one epidemic under his observation he believes that the high mortality-rate was perhaps due to the universal application of concentrated solutions to the whole surface of the fauces.

DR. J. T. ESKRIDGE had seen a number of cases of multiple neuritis following diphtheria, and thinks that many of the cases of heart-failure in this disease are due to degeneration of the cardiac nerves.

DR. JOHN ELSNER called attention to the value of ferric alum as an application to the membrane, especially if the case is seen early. The solution must be carefully applied by means of a pledget of cotton, to the membrane only. Under this treatment, repeated, if necessary, every three hours, the membrane becomes gray or black, shrivels up, and disappears, and the disease is aborted. This treatment he prefers to all others, and has had his experience confirmed by many others, among them Abraham Jacobi, of New York.

DRS. MCLAUTHLIN, BRYANT, and ESKRIDGE cited cases of children who had attended school during the whole course of an attack of diphtheria, both themselves and their parents being ignorant of the nature of the illness. In one case the fact of diphtheria having existed was elicited only after the occurrence of paralytic symptoms. These gentlemen urged the importance of having schools supervised or inspected in some manner, so that such occurrences should cease.

DR. MCLAUTHLIN dwelt on the importance of reporting all cases of croup to the health authorities.

DR. SHALLENBERGER emphasized the relationship of croup and diphtheria, and spoke of the necessity of guarding against infection in all cases of croup, as though they were proven to be diphtheria. He reported a case alleged to be croup which died under the care of another physician, but within a week three adults came under his care with every characteristic symptom of diphtheria.

TWO UNUSUAL DISLOCATIONS.

BY JOHN T. DAVISON, M.D.,
OF SOPRIS, COLORADO.

Dislocation of the fifth metatarsal bone from both attachments.—J. C., a laborer, employed about the mouth of a mine in "making up the trip," while running to turn a switch, slipped and fell, one or two wheels of a loaded pit-car, which weighed three tons, passing over the dorsum of his right foot. When seen a few minutes afterward, the foot was greatly flattened. There was a tumor, almost cylindrical in shape, on the outer side, where the skin was tensely drawn over the bone; there was also a penetrating wound on the inner side just below the malleolus, and, probably, from the great weight acting upon so limited a surface, much subcutaneous bruising, if not rupture, of the tissues had taken place. The dislocation was immediately reduced by seizing the toes with one hand, making traction in the line of foot, and, with the other hand, pressing the bone into place, crepitus being appreciable. There was much swelling, accompanied by great pain. After the partial subsidence of swelling and pain, hot foot-baths twice daily, followed by a snug bandage, and, later, by inunction with neat's-foot oil, was the treatment pursued. About six weeks after the accident, while walking upon crutches, the patient slipped and fell, injuring the foot again, and doubtless retarding recovery. He is now, two months after the original injury, able to bear his weight partly upon the foot without artificial support; there still being considerable tenderness. Beyond slight swelling and discoloration, the foot presents a natural appearance. The patient will probably soon make a good recovery.

Compound dislocation of the ankle-joint, with eversion and backward displacement of foot.—Following the classification recommended by Stimson, I consider this title better calculated to convey an idea of the trauma than is the title "compound Pott's fracture"; for, although the fibula was broken at the usual point above the ankle-joint, the tibia presented none of the lesions characteristic of Pott's fracture.

Mrs. S., aged about forty-five years, quite fleshy, yet withal active, and of good vitality, while visiting Mine No. 4 at Sopris, September 20, 1890, was thrown from a wagon. She alighted upon her feet in such a manner that the distal extremity of the left tibia was forced through the flesh a distance of four inches; and also through the side of her shoe. She was seen at a neighbor's house forty-five minutes after the accident. I found her lying on a sofa, and not suffering as intensely as might be expected from such an injury. As she would not submit to etherization until her husband arrived, I contented myself with giving morphine hypodermically, cutting away the remnants of shoe and stocking, and thoroughly irrigating the protruding bone and the limb with bichloride solution (1 to 2000). The foot and lower part of her leg were finally wrapped in a towel moistened with a 1-to-1000 bichloride solution.

Upon the arrival of her husband she was etherized, and a more thorough examination was made than was possible before. The tibia was found intact, save at the extremity, where it had come in contact with the ground, the dense tissue being abraded in two or three places, exposing the cancellous structure beneath. The interarticular fibro-cartilage was attached to the end. There was a slight rent

in the periosteum, and two or three spiculæ of bone were adherent by the shreds of periosteum where the bone was abraded. As stated in the title, the foot was everted, and turned backward to a considerable extent. The small amount of soft tissue about the ankle was strikingly shown in this case, the foot appearing to hang by a shred. The dislocation was easily reduced by making traction on the foot, and carrying the foot first outward, and then, as the wound of exit came opposite the end of the tibia, inward. Previously to this, however, the little fragments of bone were snipped from their periosteal attachments. The wound of exit, as it appeared with the bone in place, was about one and one-half inches in length, and at a right angle to the shaft of the tibia. Three interrupted sutures were inserted, leaving the lower part of the wound open for drainage. The wound was covered with iodoform, and a saturated solution of naphthalin in ether, as recommended by F. S. Dennis, was poured over a considerable extent of the adjacent surface. Iodoform, bichloride gauze, and bichloride cotton were applied in the usual manner, and the limb immobilized with pasteboard splints, which completed the surgical treatment at this time.

This dressing was allowed to remain twelve days, during which time the temperature presented nothing remarkable, once rising to 102°, but subsiding after giving a purgative, and not rising thereafter above 100½°. There was very slight swelling about the wound, and none of the leg and foot. When the dressing was removed granulations in abundance were seen. There were a few drops of pus, probably from a stitch-abscess, as the slight amount of tension sufficed to cause local inflammation of the skin. She was removed to her home in Trinidad two weeks after the accident, and further treatment of the case was continued by Dr. D. G. Thompson, who applied the necessary dressings. The wound healed rapidly, so that passive motion was commenced within a month or six weeks after the injury.

Dr. Thompson, whom, I should state, assisted me at the time of the accident, tells me that three months after the dislocation she had good use of her ankle, and could bear her weight upon the foot, but was still too timid to attempt walking without support of some kind. I have reported this case in considerable detail in order to add a little to the not extensive literature upon the treatment of compound dislocations of the larger joints. The case exemplifies the good results obtained from close attention to asepsis and antisepsis.

A CLINICAL STUDY OF ERGOT.

BY JOHN C. HEMMETER, PH.D., M.B., M.D.,
OF BALTIMORE.

IN a period of medical history when new therapeutic agents are rushed upon us in an abundance which seems out of all proportion to any real increase in our knowledge of the scientific application of drugs, or to any real advancement in experimental therapeutics, a critical combination of facts which have been established in the laboratory and in the hospital concerning ergot may aid in throwing new light on the value and possibilities of one of the oldest drugs in the pharmacopœia.

The therapeutic effects of few drugs correspond so closely with their physiological action as do those of ergot. The following summary of the physiological effects of this substance shows this statement to be true:

I. Ergot causes contraction of involuntary muscular fibre throughout the body. Consequently it produces:

(*a*) Increased uterine contractions.

(*b*) Increased intestinal peristalsis.

(*c*) Constriction of the muscular walls of the arterioles.

(*a*) Very probably, constriction of the involuntary muscle-fibres surrounding the bronchioles.

II. As a result of the constriction of the arteries, ergot causes a rise of arterial pressure. A brief, temporary lowering of pressure preceding the rise, when the drug is injected into the jugular vein, is due to its local poisonous action on the heart (muscular fibre or ganglia).

III. It reduces the number of contractions of the heart in a given time.

IV. The respiratory movements are decreased in number in most animals, including man; in the dog they are increased.

V. It lowers temperature.

VI. The irritability of the peripheral motor nerves is increased, independently of the central organs.[1]

VII. The irritability of the peripheral sensory nerves is diminished, hence reflex excitability is diminished.[2]

VIII. With the retardation of the pulse-beat the height of the pulse-curve is not reduced; in all of our kymographion tracings the altitude of the pulse-curve was unaltered, though the number of systolic contractions were reduced. (This is in agreement with Köhler's and Eberty's results, and opposed to those of Bailly, Hardy, Beatly, and Bonjean.)

IX. Secale reduces the pulse-rate.

Upon the power of ergot to constrict the arterioles and to cause arterial and capillary anæmia depends its application in a large number of disease-conditions. It has been successfully used in hæmoptysis, hæmatemesis, epistaxis, hæmorrhage from the gums; renal, hæmorrhoidal, and vesical hæmorrhage; in the bleeding caused by carcinoma; and in hæmorrhage dependent upon a dyscrasia, as purpura hæmorrhagica. In menorrhagia and

[1] Köhler, Virchow's Archives, lx., 1874.
[2] Köhler, loc. cit.

leucorrhœa, which are produced in certain cases by endometrial congestion; in colliquative sweating due to relaxation of cutaneous capillaries; in enlargement of the spleen and in vascular goitre it has been found of value. Langenbeck[1] instituted a successful treatment of aneurism by secale, and was followed by Dr. Paul Vogt,[2] who states that Schneider cured a femoral aneurism, and Dutoit one of the subclavian artery, with this drug.

Ergot has also been advantageously used in congestive headaches and in impaired vision from congestion of the retina incident to dilated or hypertrophied heart. Intestinal catarrh with diarrhœa, due to congestion of the intestinal mucous membrane, is a special indication for the use of ergot. It has proven itself to be very useful in dysentery and in galactorrhœa. The power of ergot to contract the uterus has been utilized to remove uterine fibroids, by strangling their vascular supply and by causing uterine contraction. There is good authority for crediting it with a beneficial influence over cervicitis, pharyngitis, and even gonorrhœa, and over paralysis of the bladder from distention, or in that due to cerebral or spinal lesion.

The theory of its action is based upon the artificial anæmia which it induces in the arterial vessels, so that the histological process of inflammation is impeded.

In small aneurisms of the peripheral main arterial trunks, Langenbeck held that the drug brought about a cure by contraction of the unstriped muscular fibres in the affected portion of the vessel. We have reason to believe from studies on the rabbit's omentum, and on the frog's web, that the characteristic effect of ergot in constricting blood-vessels and producing arterial, capillary, and venous anæmia is exercised most markedly in those regions which are diseased. The arterioles in the neighborhood of a region undergoing changes coincident with the first stage of inflammation, will be found, micrometrically, to undergo greater degrees of constriction than those in normal regions. Arterioles that are pathologically enlarged seem to require less stimulus to contract than normal ones, because the natural tendency of an expanded muscular coat of an artery is to resume the average lumen which it occupies during normal arterial tension. We therefore have a right to conclude that when ergot is given to a patient suffering from an acute localized inflammation—pneumonia, for instance—its main influence is exercised upon the parts pathologically altered, while those parts of the circulation in which normal arterial tonus has been maintained are but slightly affected.

In most nervous diseases ergot is of doubtful efficacy, except in those forms in which symptoms and signs indicate hyperæmia and congestion of the spinal or cranial meninges, or an acute inflammation of the cord-substance.

In the treatment of the psychoses, in which ophthalmoscopic examination justifies us in diagnosing intra-cranial congestion and, perhaps, inflammation, ergot has proved to be a valuable adjunct to other methods of treatment. The same can be said of its use in certain forms of epilepsy. In locomotor ataxia and diabetes mellitus, ergot has, in our experience, failed to relieve.

The property of diminishing the irritability of the peripheral sensory nerves and the consequent reduction of reflex action, has, according to Köhler[1] been utilized in the treatment of diseases in which the reflex excitability is greatly increased, as in chorea, and certain forms of epilepsy and tetanus.

Although these influences of ergot over peripheral sensory nerves have *per se* little therapeutic utility, they become important in connection with the other well-established effects of the drug. In all acute inflammations, with high fever, rapid pulse, hurried respiration, and congestion, if we can employ a drug which will allay these symptoms and at the same time lower reflex excitability, it is most desirable to do so. The power of ergot to reduce temperature, the number of pulse-beats, the number of respirations, and at the same time maintain increased arterial-pressure, makes it a most important agent in the management of certain conditions in pneumonia.

We shall now proceed to record a series of personal observations (excepting those referring to the obstetric employment of ergot) on the indications for the use of secale and its positive or negative results in the following diseases and conditions:

Labor, pneumonia, bronchitis, hæmoptysis, dysentery, mitral regurgitation, aortic insufficiency, dilatation of the heart, goitre, meningitis, epilepsy, locomotor ataxia, hemicrania, and diabetes mellitus.

ERGOT IN LABOR.—It would require the pen of an experienced obstetrician to do justice to the subject of the use of ergot in labor, but it has been thought expedient to give the drift of opinion as expressed in the literature on the subject since 1878. In these records it appears that the experience of the most authentic authors has not changed the rules for administering ergot in labor since they were first systematically collated by Köhler[2] and copied into most standard works on therapy. These indications are:

I. In lingering labors when the child's head is low, the parts relaxed, the pains absent or feeble, and there is danger in delay from hæmorrhage or other alarming symptoms.

[1] Berlin. klin. Wochenschrift, 1860, vol. vi.
[2] Ibid., March, 1872.

[1] Physiol. Therapeutik, p. 207. [2] Physiol. Therapeutik.

II. When the pains are suspended and convulsions set in, venesection being necessary.

III. In inevitable abortion.

IV. When the placenta is retained, owing to uterine inertia.

V. In post-partum hæmorrhage.

Disease of the uterus, deformity of the pelvis or spine, and similar conditions, forbid its use. Even resistance of the soft parts, as may be anticipated in a primipara, contra-indicates the use of the drug. It has been accused of causing rupture of the uterus, but this is doubtful.[1] The manner of action of ergot upon the uterus in labor is claimed by some to be unlike that of the natural forces. The natural contractions are intermittent and rhythmical, while those under ergot are constant, steady, and, as it were, tetanic, tending to destroy the child by interrupting the placental blood-supply and impeding the fœtal circulation, for the life of the fœtus depends upon the aëration of the blood during the intervals between the expulsive contractions. If it were true that the contractions under ergot were tetanic and without remissions, the respiration of the fœtus would be stopped and its life imperilled. We shall, however, present satisfactory experimental and clinical evidence, on very good authority, that the contractions of the uterus produced by ergot are in every particular normal and not tetanic. Before we proceed to this evidence we may consider the objection to the employment of secale on the grounds that the drug circulating in the maternal blood becomes dangerous to the heart of the child,[2] reducing the number of its beats to 110 or less, and rendering the heart's action feeble and irregular.[3] It is Köhler's[4] opinion that in such cases the dose of the drug has been excessively large, its administration undertaken too early and before the parts were prepared for the expulsion of the child. On the other hand, Garraway[5] resuscitated, by giving ergotin, a newborn babe whose heart-sounds were irregular and scarcely discernible, the child being almost asphyxiated.

This suggestion of treating asphyxia in the newly-born was first made by Dépaul.[6] If any organ is stimulated to function by an irritant applied to its centre in the brain or cord, or to the nerve or nerves going from that centre to the organ, the latter responds in its normal manner, provided the stimulation be not excessive. A muscle will respond to electric stimulation of its nerve by normal contraction, but if the stimulation be too powerful a tetanic contraction is the result. These facts apply mainly to muscle physiology; in organs that give no physical evidence of responding to stimulation we are unable to arrive at similar conclusions, but in the case of the uterus, if a physiological dose of ergot is employed, the result will be normal contractive movements. Whenever tetanus results, one can safely presume that the dose has been toxic. The most recent scientific study of the use of ergot and its action in labor was contributed by Schatz to the Third German Gynecological Congress, at Freiburg.[1] The conclusions of Schatz are, in the main, as follows:

I. The contractions of the uterus, when produced by ergot, in their manner and character do not differ from the normal. Ergot produces properly co-ordinated contractions of the uterus, provided large doses have not been given, and, hence, most probably acts by direct stimulation of the centre for uterine contraction.

II. In case the contractions are already present, ergot increases their number, but does not render them stronger. The intensity of the force of the contractions is influenced only in proportion to their frequency.

III. As a general rule, in normal labor the force is greatest when the frequency of the contractions is from six to ten in thirty minutes. One should, in the employment of ergot, seek to maintain this frequency and not allow it to exceed ten contractions in thirty minutes.

IV. The action of secale begins fifteen minutes after its administration by the mouth, and is greatest in thirty minutes. One can, therefore, judge of the effect of a dose of the drug only after the second half-hour after it has been given, and should under no circumstances administer it oftener than once in an hour, if one wishes to avoid the risk of producing too frequent and consequently too weak contractions by cumulative action, or of causing uterine tetanus.

V. The effects of a dose last for one hour only, and the drug must, therefore, be repeated hourly. As a general rule, the proper dose to give is a very small one if uterine action has already begun. In order to be sure of avoiding too great a frequency of contraction with all its detrimental effects, it is necessary to begin with from 8 to 10 drops of the fluid extract, for instance,[2] and to increase it with great care, repeating its use not sooner than one hour after the preceding dose.

The deductions of Schatz show much careful observation, and his facts are handled with scientific acumen. His experimental results were obtained by means of the tokodynamometer.

Recent testimony regarding the power of ergot

[1] See Stillé's Therapeutics, second edition, vol. ii. p. 501.
[2] Hardy: Dublin Journ. of Med., xxvii. 225.
[3] McClintock: Dublin Quart. Journ., May, 1865.
[4] Loc. cit.
[5] British Medical Journ., February 3, 1864, p. 176.
[6] Bull. de l'Acad., x. 565.

[1] See also Schatz, Arch. für Gyn., Bd. 35, H. 3.
[2] Pharm. Germania.

to cause abortion seems to be divided. If the mother and fœtus are healthy and other irritants are excluded, it is presumed that ergot will not *per se* induce abortion. The expansion of the uterus during gestation is a purely physiological process; ergot, therefore, as a rule, fails when used for criminal purposes (Wright and Bonjean). In pregnant animals, however, abortion seems easily induced by ergot.[1] Ramsbotham[2] found, after numerous trials, that ergot, with few exceptions, promptly induces expulsive action in the human female. On the whole, the abortifacient influence of ergot seems uncertain.[3] It is certain, however, that one of the principal phenomena of ergotism in both animals and the human being is frequent abortion, so that this result will have to be classed with the toxic effects of the drug.

ERGOT IN PNEUMONIA.—Dr. N. S. Davis contributed to the *Journal of the American Medical Association*[4] a clinical report of two cases of pneumonia in which certain alarming features of the disease were effectually relieved by the use of ergot. After remarking that there is no fixed rule or routine of treatment which is adapted to all cases of pneumonia, simply because the morbid processes which constitute the different stages of pneumonic inflammation are liable to be much modified by the previous condition of the patient and the coincident meteorological and sanitary influences that surround him, he designates the benefits to be derived from ergot. When there is a demand for more steadiness and tone in the action of the heart, he asserts that if given in connection with digitalis it is perhaps the most reliable agent that we possess for resisting the over-engorgement of the pulmonary vessels during the first stage of the disease in which this condition of the heart is found to exist. The first case Dr. N. S. Davis reports appeared at first to be an uncomplicated case of catarrhal pneumonia. "No alarming symptoms occurred until the end of the second day, when the exudation began to increase with such rapidity that before the middle of the third day the left lung was completely engorged and dull on percussion from the apex to its base, and there was commencing crepitation in the lower part of the right. Pulse 120 per minute; temperature 103° F. The breathing was oppressed, short, and frequent, with mucous râles rapidly increasing in the larger bronchi. The expectoration was copious, thin, and very bloody. It became evident that before the end of another day, at the same rate of progress, both lungs would be completely filled with exudation and the patient suffocated. Professor Davis directed in consultation 3 grains of ergotin every two hours; also, 2 grains of quinine and $\frac{1}{60}$ grain of strychnine every four hours in addition to 10 minims of tincture of digitalis with aromatic spirit of ammonia alternating with the ergotine. A blister, followed by emollient poultices, was also applied. Under this treatment the aspect of the case was changed in twenty-four hours; the respirations became slower and deeper, the pulse was 108 and more full, the coarse râles were fewer in number, and the bloody expectoration diminished one-half. The patient made an unusually rapid recovery.

The second case presented a similar clinical picture; the treatment was the same, with the exception of the digitalis. It seems, however, that this second case may have received too much of the drug, at least the singular occurrence of a collapsed condition of the circulation and entire cutaneous relaxation, the skin being cold and wet with perspiration, and the pulse hardly perceptible at the wrist, may have been a reaction from the toxic effect of ergot. To restore the tone of the cutaneous vessels and increase the force of the heart's action give digitalis, belladonna, and aromatic spirit of ammonia. When one has used ergot, digitalis, ammonia, quinine, and strychnine to combat a rapidly-spreading pneumonic exudation, it becomes a matter of difficulty to decide to which drug the effect of checking the process is due, and although we are able to sift out the action of ergot in the case of Dr. Davis's admirable account, this objection to the accuracy of the deductions is a plausible one.

In the two cases, one of catarrhal and one of croupous pneumonia, with an exudation filling up the entire left lung, and with coarse moist râles throughout the left lung, ergotole was employed, the clinical chart which follows being a record of the latter. The expectoration in both cases was profuse, thin, and contained an abundance of blood. From the time that the infiltration first became manifest by unmistakable physical signs, with rapid, weak pulse, hurried respiration, and high fever, the patients were put upon ergotole 15 minims in half an ounce of whiskey every two hours. Although a number of other remedies were kept at hand to be used hypodermically, should occasion arise, none them was made use of. These two cases of pneumonia were treated exclusively with ergotole and good nourishment, and both made a speedy recovery. In these cases we are warranted in believing that the ergot in itself had a specific influence over the progress of the exudation, for no such effect could reasonably be attributed to the whiskey which was taken. After the fever had subsided and the pulse

[1] Diez, Oslere, Percy, and Laurent in Stillé's Therapeutics, 2d ed., vol ii. p. 585.

[2] Principles and Practice of Obstetrical Medicine and Surgery, Philadelphia, 1860, p. 318.

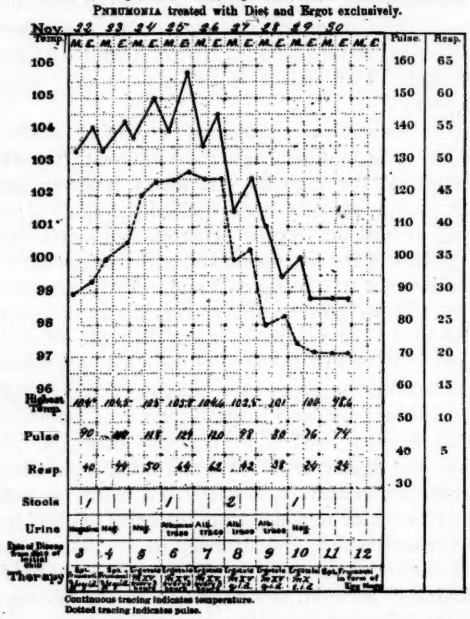
[3] Taylor: Principles and Practice of Medical Jurisprudence, vol. ii. p. 193.

[4] 1884, vol. ii. No. 14, p. 369.

was almost normal, both cases were put on tonic mixtures containing iron, quinine, and strychnine.

Dr. Sunol[1] shows that the action of ergot on unstriped muscular fibre may also be of use in various acute affections of the respiratory apparatus. Thus, in intense acute bronchitis, when there is difficulty of expectoration it serves a useful purpose in emptying the bloodvessels and contracting the bronchial muscles.

Record of Temperature, Pulse, Respirations, etc., of a case of CROUPOUS PNEUMONIA treated with Diet and Ergot exclusively.



Continuous tracing indicates temperature.
Dotted tracing indicates pulse.

Sunol has used ergot successfully in the congestive stages of pneumonia, and very accurately recorded the physiological effects. He states that the breathing becomes slower and easier, the temperature falls, the expectoration becomes free and much diminished in amount. In pulmonary engorgement, he urges that ergot should take the place of bleeding.

It appears from the foregoing, that the indications for the employment of ergot in pneumonia are symptomatic; the special characteristic and tendency must be in each case carefully studied, and the drug promptly administered when we are certain of pathological changes which we know the physiological effects of the drug will effectually counteract.

According to A. L. Loomis,[2] it is still a disputed question whether the bronchial or the pulmonary capillaries are the chief source of pulmonic exudation. The lung-tissue is nourished by the blood in the ramifications of the bronchial arteries, while the capillaries of the pulmonary arteries and veins are the passive media for the interchange of gases. Hence, it has been claimed that the bronchial capillaries only are implicated in the inflammatory process. Virchow has shown that the pneumonic process can be completely established in places where the pulmonic capillaries cannot be traced on account of the plugging of a large branch of the pulmonary artery.[1] He concedes, however, that the capillaries of the pulmonary artery and vein are secondarily actively concerned in the inflammatory process. On the other hand, it has been claimed that in the early stage of the pneumonic process the parts that are supplied by the bronchial capillaries are not reddened or injected as they would be were these vessels primarily concerned in the inflammatory process. It is probable that both sets of vessels are involved, but that at the beginning one set is implicated to a greater degree than the other. We will dwell on this matter to some extent under the heading of hæmoptysis.

During the course of any inflammatory process there is a period when transudates are formed. The swelling which occurs in the inflamed area may be regarded as a macroscopic evidence of the process of transudation. We learn from R. Klemensiewicz[3] that a large number of experimental facts support these assertions. The first stage of pneumonia, in which at times alarmingly rapid transudation occurs, often cannot be differentiated from the symptoms of pulmonary congestion and œdema, and is a process in which the blood plasma, and later on the corpuscular elements of the blood, pass from the interior of the bloodvessels to the surrounding spaces. The difference in the specific gravity of the constituents of the blood and the condensation of the axial part of the blood stream explain, according to Schklarewsky,[3] why the plasma escapes first and the corpuscles later on. During the process of exudation the so-called Poiseull space disappears in the vessels, and the corpuscular elements appear adjacent to the vessel wall.[4]

The vessels are, at the beginning of the transudation, only moderately filled with corpuscles, but as the process goes on the vessels become packed with corpuscles and the velocity of the blood current becomes much slower. Glax and Klemensiewicz have shown that a current is possible and does occur in the artery of an inflamed vessel after complete stagnation has occurred in the capillaries and veins connected with it. This is the only possible ex-

[1] London Medical Record, December 15, 1884.
[2] Amer. Syst. Pract. Med., vol. iii. p. 308.

[1] Gesammte Abhandlungen, p. 369.
[2] Fundamental Versuche über Transudation, Graz., 1883.
[3] Schklarewsky: Pflüger's Archiv, Bd. i. pp. 603 and 657.
[4] Rynek: Zur Kenntniss der Stase des Blutes in den Gefässen entzundeter Theile.

planation for this phenomenon. The liquid constituents find an exit from the interior of the vessels into the space surrounding them by lateral openings which exist in the walls of the vessels themselves. The capillaries possess permeable walls. The permeability of the vascular walls is, however, not confined to the capillaries, for to a greater or less degree the walls of the smaller arteries and veins possess this property of permeability. The permeability of vascular walls varies according to their location; that is, exudation will occur to a greater extent in loose than in dense tissue. The permeability increases in the larger arteries toward the veins and as the blood-pressure decreases. The onset of transudation is coincident with the pathological change in the vessel wall, and it is this change, and not an increase in pressure, which causes the exudation in pneumonia.

We believe that ergot exercises a very decided effect upon the pulmonary vessels.

Transudation has been proved, by a very large number of observers, to depend mainly upon the permeability and elastic distensibility of the blood-vessels.

If the reader will consider these facts for a moment, and then think of the physiological action of ergot, he cannot fail to realize what a powerful agent this drug is in checking inflammatory exudation, as clinical experience has undoubtedly proven it to be in the first stage of pneumonia. If transudation depends upon the permeability and elastic distensibility of the vessels, we know that ergot, by constricting these, can reduce peri-vascular engorgement.

If transudation is associated with increased heart's action, we know that ergot reduces the number of heart-beats.

If the beginning of pneumonic exudation is associated with hurried breathing, we know that ergot reduces the number of respirations per minute.

If transudation is connected with fever, we know that ergot reduces temperature.

If the fever in inflammatory exudations lowers blood-pressure, we know that ergot raises it.

All of these physiological effects directly counteract the main features of the pathological process, and check further transudation, while the lymphatics carry away the exudation that has already occurred.

In the experimental part of this report[1] we did not mention a number of experiments which we undertook with Ludwig Stromuhr, to measure the velocity of the blood-current in the carotid artery of dogs. The velocity of the carotid current in a dog was estimated at 206 mm. in a second. Under ergot—*i. e.*, five minutes after 1.5 c.c. of ergotole in defibrinated blood had been injected into the jugular vein—the estimate of the velocity was 169 mm. in a second. The same fact was established in the case of a cat. We have here an experimental proof that the amount of blood flowing from a bleeding (torn) vessel in a given time will be less after the animal has received ergot. That the reduction was due to ergot, and not to accident, was proved in the dogs after the effect of the drug had subsided. In fifty minutes the velocity of the current in the carotid of the same animal was estimated at 200 mm. in a second; and at this time a second injection of 1.5 c.c. of ergotole, similarly diluted, was made into the jugular vein. The next estimate—taken eight minutes after this injection—showed the velocity reduced to 163 mm. in a second. Hence, we have a right to believe that ergot directly reduces the rate of the blood-flow, probably by reducing the work of the heart and opposing more resistance to the stream by constricting the unstriped muscular fibres in the vessel-walls.

(To be concluded.)

[1] See THE MEDICAL NEWS, January 31st and February 7th.

A BRIEF REPORT OF FOUR MONTHS' SERVICE IN THE SURGICAL WARDS OF THE PENNSYLVANIA HOSPITAL.[1]

BY THOMAS G. MORTON, M.D.,
ONE OF THE ATTENDING SURGEONS.

THE following very brief review of the more important surgical work which came under my care at the Pennsylvania Hospital during my term, which represents half of the service, which has just expired (from October 1, 1890, to January 1, 1891, inclusive), may, I trust, be not without interest.

At the very outset, I will state that in all the surgical work aseptic precautions were rigidly observed, as heretofore. In quite a number of cases this was rendered difficult from the fact that patients not infrequently were brought from a distance with their wounds already dressed, perhaps hours before arriving at the hospital. In some instances wounds, which apparently had been carefully dressed, were found, upon examination, to be impregnated with coal-dust or other extraneous matter. In all such cases the rule was observed to reopen, examine, and redress the wounds.

One interesting example of this kind was admitted from the coal regions in November. The patient was a miner, whose thigh was crushed by falling coal. His wounds had been dressed by a neighboring surgeon at the time of the accident, and he

[1] Read before the Philadelphia Academy of Surgery, February, 1891.

was not brought to the hospital until thirty-six hours afterward. The external wound, which was extensive, and had been carefully and tightly sutured, was reopened, when it was found that there had been complete division of all the muscles on the posterior part of the middle of the thigh, exposing the sciatic nerve and the femur; numerous particles of coal and other foreign matter were found in the tissues and elsewhere. The wound was then thoroughly cleansed, and the divided muscles carefully approximated and closely sutured, which was followed by prompt healing, the patient recovering with good flexion and extension.

It is worthy of comment that during this term of service there was not a single case of erysipelas, septicæmia, or tetanus, no secondary hæmorrhage or other complication following any major operation, and but two deaths following operations. One of these occurred after an abdominal section, which will again be referred to; the other fatal result followed an amputation of the thigh, crushed in a railroad accident. On account of extreme shock from the injury and loss of blood from the femoral artery, which had been torn, it was impossible to operate until twenty-four hours after the accident. Death followed from recurring shock.

Amputations and wounds incident to operation or injury invariably healed by first intention; indeed, suppuration occurred only in such cases as perineal section, suprapubic cystotomy, etc., in which the wound could only close by granulation. In one case of perineal section several hæmorrhages occurred, but it was subsequently ascertained that the patient had always been of a markedly hæmorrhagic diathesis. He afterward made a good recovery.

The strength of the mercuric solutions for irrigation was uniformly 1 to 1000, and for the wet dressings 1 to 2000; in case of young children this was reduced to 1 to 2000 and 1 to 4000, respectively.

Whenever possible, the region of operation was cleansed on the previous day, or even earlier, and the parts were carefully protected by towels wrung out of the bichloride solutions. In no case was there toxic effect from the absorption of the bichloride solutions, or irritation from its application, on the body of the patient or hands of the attendants.

As a dusting powder, "aristol" was used almost exclusively; it is probably a germicide, and does not produce irritation, while its freedom from odor is in its favor. It seems to be more efficient and in every way superior to iodoform.

In all cases catgut was used for ligating arteries, for approximating bone-surfaces after resection, etc., for closing and for draining wounds, and even for the drainage after amputations. Rubber drainage-tubes were used in operations in the chest cavity, and glass tubes for the abdominal sections. Silk was employed for suturing the intestines and closing wounds after operation.

In the treatment of "shock" strychnine was administered hypodermically, and gave excellent results, in doses of from $\frac{1}{60}$ to $\frac{1}{80}$ of a grain repeated about every half-hour.

In the treatment of fractures I have nothing new to report. The dressings were always of the most simple kind; the fracture-box, which was often suspended, was used for fractures of the legs; extension with lateral support by the sand-bags for the femur, and after union had occurred moulded pasteboard, silicate of sodium, or plaster dressings were applied. In fractures of the humerus, moulded pasteboard splints were employed externally, the chest-wall being utilized in many cases for the internal splint; the right-angled splint was all that was required in many cases.

Fractures of the lower end of the radius required no special form of splint, the complete and immediate reduction of all displaced fragments making the treatment very simple.

In explanation of the comparatively small number of fractures during a winter term of service, and especially of the small number of the upper extremities, it should be stated that a very large number of fractures coming to the hospital were dressed in the receiving ward, and then sent to the out-department. Only the more serious of such injuries were received in the wards. One hundred and four cases of fracture were taken into the hospital. Of these, sixty-nine were *simple fractures*—sixteen of the femur, and twenty-three of the tibia and fibula, the remaining number included the patella, scapula (one due to muscular violence), ribs, pelvis, vertebræ (spinous processes only), and upper extremities. Thirty-five were compound fractures—six of these involving the femur, five the tibia and fibula, twelve the skull, and twelve the upper extremities.

OPERATIONS.—Five compound depressed fractures of the skull required trephining; the wounds closed by immediate union, and without any subsequent symptoms. In trephining, when possible, especially when the scalp wound is of considerable extent, I prefer not to use an anæsthetic.

Of thirteen amputations, three were amputations of the thigh, three of the leg, and seven of the arm, forearm, and foot. All recovered, except one case of thigh amputation, already referred to.

Seven laparotomies were performed.

One case of purulent peritonitis, apparently idiopathic from its rapid course, seems worthy of record.

Emil L., about fifty years of age, living about seventy miles from Philadelphia, had occasional slight attacks of abdominal pain during the pre-

ceding four or five years, but had never had any serious illness. Present attack came on about eight hours before admission. He had been hard at work during the morning, cutting and hauling ice; at noon he rode to his home on a load of ice, and ate heartily of pork and cabbage. Pain came on suddenly, and he took a train for his son's home in Philadelphia. Arriving in great distress, he was brought to the hospital, and was admitted to the medical ward about eight o'clock the same evening. He was not improved by treatment. Toward noon on the following day his temperature had fallen to 97.4°, pulse and respiration increased, and a fatal termination seemed inevitable; sixteen hours after admission the case was transferred to the surgical ward by Dr. Da Costa. An exploratory abdominal incision revealed the presence of purulent peritonitis; the bowels were covered with recent flaky lymph, and the belly cavity contained pus. The appendix was examined and found normal, and no local cause for the disease could be discovered.

The patient died five hours after the operation. A post-mortem examination could not be obtained.

Two of the cases of abdominal section for removal of the appendix vermiformis seem worthy of record; the first was that of a pericæcal abscess. The history of the case is as follows:

George I., aged thirty years, was admitted May 12, 1890, in a prostrated condition, and with a history of pericæcal inflammation, followed by symptoms indicating perforation of the appendix and abscess.

The attack came on suddenly with pain in the region of the appendix, which was greatly increased by pressure; there were nausea, fever, and constipation. Later, there was a sudden accession of intense pain, with deep swelling, general abdominal tenderness and tympany. The temperature was fluctuating and there were chills and profuse sweating. The skin over the ileo-cæcal region became discolored and somewhat œdematous, but no distinct tumor could be felt at any time, yet there was a hardness of the deep tissues. Such were the conditions on admission. A lateral incision was made directly over the region of the appendix, and a large abscess cavity containing fœtid pus was exposed; careful search failed to discover the appendix, but the surrounding organs were so matted together by adhesions, that further exploration was not deemed prudent. It was supposed that the appendix had been destroyed by the violence of the inflammation, which had probably resulted in gangrene of the organ.

The abscess and abdominal cavity were thoroughly washed and two drainage-tubes were inserted, one of glass to the bottom of the pelvic cavity, the other of rubber into the most dependent part of the abscess cavity.

A rapid recovery followed, but a fistulous opening remained, which now and then discharged excrementitious matter, showing that an opening existed in the intestine, which was probably at the site of the appendix.

In October a second section was made directly in the line of the first operation, for the purpose of closing the fistula. On reaching the cæcum, it was found that all the adhesions which were present at the first operation had been completely removed. The cæcum could be readily manipulated, and was found open, as expected, at the site of the appendix, which had unquestionably sloughed off, leaving a fistula of sufficient size to admit the end of the little finger.

The fistula was closed with nine Lembert sutures. Rapid and perfect recovery followed.

The history of the second case is as follows:

Mrs. E. S., aged forty-six years, was admitted January 5, 1891, with symptoms of appendicitis, which had existed for a week. There had been considerable pain, with elevation of temperature, abdominal distention, constipation, furred tongue, and vomiting. Directly over the ileo-cæcal region a tumor was discovered which was movable and exceedingly painful upon pressure. There had been neither chill nor sweating. The symptoms pointed to irritation or inflammation of the appendix, or of the peri-cæcal region, but not to abscess. A lateral section was made on the eighth day. Upon entering the abdominal cavity, the tumor proved to be an immensely elongated and distended gall-bladder about five inches in length, lying directly over the appendix. A careful examination failed to show the presence of gall-stones. The appendix was found inflamed and thickened but quite free from adhesions. The mesentery and appendix were ligatured and cut away. The stump of the latter was then inverted and invaginated into the cæcal cavity. The peritoneum was brought together over the inverted stump by five Lembert sutures. No drainage-tube was used, and the wound was closed with a few sutures.

The patient left the hospital on the twenty-first day in good condition.

Two cases of brain abscess, one involving the cerebellum and the other one lobe of the cerebrum, are interesting from the fact that neither presented symptoms which are commonly found in such lesions.

CASE I.—The patient, thirty-six years of age, was sent from the out-patient department of the Pennsylvania Hospital to the surgical ward, by Dr. Harlan, on account of an aural polypus and purulent otorrhœa. The patient presented no special symptoms during his stay in the hospital; there was only a slight rise of temperature, no chill, and apparently no motor or sensory symptoms. A few days after admission he complained of a general headache, soon became comatose, and never regained consciousness. There were no symptoms at any time indicating an abscess. Dr. Harlan also saw the patient, and agreed with me in this opinion.

The autopsy showed serious disease of the petrous portion of the temporal bone; the inflammation extended from the middle to the internal ear, thence through the internal auditory meatus to the cere-

bellum by continuity, where a large abscess was found.

CASE II.—A man, aged twenty-four years, was admitted to the medical ward. He had been working as a night brakeman on the Reading Railroad until early in the morning of the day that he was brought to the hospital. He went to his bedroom that morning, and was not seen until evening, when he was found unconscious. When brought to the hospital his pulse was slow but regular, pupils equal, respirations full and deep, and limbs rigid, but there was no paralysis.

His companions stated that he had never complained, had always performed his work, and that he had appeared in good health up to the time when he was found unconscious.

The autopsy showed a very large abscess in the anterior lobe of the cerebrum, greatly distended by recent hæmorrhage, which had caused sudden death.

Ten dislocations were treated, of which two were dorsal luxations of the hip, while the others were of the humerus, clavicle, and elbow, the latter in a child, and without fracture.

Of ten gunshot wounds, there were two involving the thigh, in one case the ball passing through the penis and scrotum; four of the arm and leg; and four of the chest-cavity. One of the latter cases died soon after admission from internal hæmorrhage. Nine cases of concussion of the brain recovered.

Of miscellaneous operations there were: 1 suprapubic cystotomy (stone weighed 960 grains), 1 perinephritic abscess (opened and drained), 3 preliminary ligations of the femoral artery, 3 removals of testicles (tuberculous and syphilitic), 4 perineal sections for impermeable stricture.

There were also a number of cases of amputation of breast, removal of bony, fatty, and other tumors; strangulated hernia; repairing of cervix and perineal lacerations; fistula in ano; fissures and hæmorrhoids (the latter were all treated with the ligature); resection of the shaft of the femur, the tibia and fibula, and humerus; opening of deep and superficial abscesses, in the interior of bone and in soft parts; minor plastic operations, and resection of nerve-trunks. Taken collectively, these operations form a wide range of work. In the operative treatment of all the cases, it is gratifying to report that there were but two deaths, already referred to, both of which occurred within twenty-four hours after admission, and both presented almost fatal conditions when admitted.

DISCUSSION.

In discussing this paper, DR. J. EWING MEARS said that among the many cases presented in the report made by Dr. Morton, none possessed greater interest than the one of acute suppurative peritonitis. The history of the case—the exposure to cold after very active exercise, and, possibly, while the skin was wet with perspiration, with the imprudence in diet, as exciting causes—made the diagnosis of idiopathic peritonitis clear. While the evidence afforded by recorded cases shows that this form of peritonitis is rare, the clinical history in the present case is sufficiently distinctive. When the disease has progressed to the stage of suppuration, abdominal incision, combined with antiseptic irrigation and drainage, is the method of treatment which should be employed.

DR. J. H. PACKARD said: "My attention has lately been called to the fact that in some places, especially on the Continent of Europe, the chisel is preferred to the trephine in opening the skull. I would like to know if any of the gentlemen present have seen the chisel used in this way, and whether it is different from the one used in ordinary surgical operations?"

DR. JOHN B. DEAVER: "Dr. Morton mentions a case in which a lacerated wound of the leg was brought into the hospital in a septic condition. This is one of the troubles hospital surgeons have to contend with. The great difficulty met with in the treatment of compound fractures is that the wound is septic at the time of admission. Our ambulances should be so prepared with antiseptic appliances that, from the time the ambulance-surgeon arrives at the scene of the accident until the case reaches the hospital, the wound could be under antiseptic treatment. Our patrol system should also be so arranged that antiseptic measures could be carried out. I recall one case of compound fracture of the forearm in which septic osteomyelitis followed, and in which amputation was eventually required. Had the wound been rendered aseptic at once, there is a bare possibility that so radical an operation as amputation might have been avoided. I think it would be well if some concerted action were taken by the Fellows of the Academy relative to this point.

"Dr. Morton reports a case of rather severe hæmorrhage following perineal section. I recall a similar case which occurred during my hospital service, some two years ago. I operated for an impermeable stricture involving the membranous urethra. Consecutive hæmorrhage necessitated packing the wound. Twelve hours after the operation, I was called on account of symptoms of concealed bleeding. I found a tumor in the hypogastrium, which proved to be a blood-clot. The clot suppurated and caused septicæmia, from which the patient did not recover for three months. Here there was a decided family history of the hæmorrhagic diathesis.

"I would ask Dr. Morton how he treats fractures of the patella. Recently, I was asked to see a warm personal friend—a physician—who had fractured the patella of the right side. He also had an ununited fracture of the patella of the left side. He had sent for a surgeon, who employed a posterior splint. He asked me what I would have done under such circumstances. I declined to say anything about the case, except in consultation with the attending surgeon. A meeting was appointed, but the surgeon did not appear. I then felt at liberty to tell my friend that if it were my patella I would have it wired or have Malgaigne's hooks applied. When the surgeon arrived, he stated that he disapproved of such treatment, and upon the following day brought with him a letter from a prominent surgeon condemning both of

these operations. Dr. Phelps, of New York, has reported forty-three cases of fracture of the patella treated successfully by wiring. I prefer to treat these fractures with Malgaigne's hooks. It is claimed that the use of the hooks converts the fracture into a compound one. This is a mistake; but, even were it so, it would make but little difference, if antiseptic surgery amounts to anything."

DR. MORTON: "I have not used Malgaigne's hooks for years. In all suitable cases I open the joint by a vertical incision, and after drilling the fragments in at least two places, make close approximation with large size catgut. In every case so treated there has been apparently good bone union.

"One very serious objection to Malgaigne's hooks is, that very commonly torn portions of the ligamentous tissue after fracture fall in between the upper and lower fragments, and prevent bony union."

DR. MEARS: "When this subject was under discussion in the Academy some time ago, I stated that I thought the time had come when, in considering fracture of the sesamoid bone due to muscular contraction, the nomenclature could be changed so as to express more accurately the condition present, and thus lead to more rational methods of treatment. In fracture due to muscular action the structure essentially involved is the ligament, and as the result of the vulnerating force there is a rupture of the fibres of the ligament, accompanied by stretching of the unbroken fibres. In these cases, treatment by the former method, which had for its object apposition of the fragments of the bone, resulted in the infolding of the lacerated and stretched fibres so that they either rested between the ends of the fragments or over them. As the process of repair takes place the folds become attached to each other by plastic material, which is not very great in quantity. If the patient is confined at rest for a period of two, three, or four months, the union may become firm enough to prevent, under ordinary force, the separation of these folds, and with them the bony fragments. In fracture due to direct violence, there is contusion of the ligamentous fibres with fracture of the bone, but not rupture of the fibres of the ligament, and hence there is little or no separation of the fragments. The first condition may be properly designated as a rupture of the ligament with fracture of the bone; the second as a contusion of the structure with fracture. The treatment in the first condition is manifestly the same as that practised in case of rupture of a tendon anywhere, viz.: Exposure of the part by an incision, removal by the knife of the lacerated and stretched fibres, and suture of the divided ends of the ligament. If this is done thoroughly, it matters little what takes place between the ends of the bony fragments, as the bone originally does not contribute in any way to the strength of the ligament. In the second condition, in which the ligament is simply contused with fracture of the bone, rest upon a splint will give a successful result, as separation of the fragments cannot occur with the ligament untorn."

IODOFORM-POISONING.

An Addition to its Literature, with the Report of Four New Cases.

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BUT few cases of affections of the skin and subcutaneous tissue following the surgical use of iodoform have been reported. It is, therefore, remarkable that four such cases have come under the observation of the writer, three within the last eighteen months. It will be seen, too, that three of the cases had some interesting phenomena in common.

CASE I.—Mrs. K., aged forty-five years; plethoric; was treated for a varicose ulcer above the ankle. The skin around the ulcer having become macerated by the use of adhesive strips, about two drachms of iodoform ointment (one drachm to the ounce of lard) were smeared on lint and applied under an elastic-roller bandage in the morning. A few hours afterward the leg began to itch. In the afternoon intense burning pain in addition to the itching caused the patient to remove the bandage. Her whole leg, from the instep to about two inches below the knee, was inflamed, swollen, and covered with blebs which had in part broken and discharged a serous fluid. The itching soon became general but there was no spread of the eruption, although free perspiration came on. Twenty-four hours after the application the patient noticed a sensation of tension and stiffness in the skin of the face. Œdema of the eyelids soon appeared and was followed by a rapidly-developing swelling of the face and temples, including the ears. This swelling was not inflammatory, or sensitive, but seemed quite resisting to the finger. On the second day a papular eczema developed on both forearms, the arms, the neck, and the upper third of the chest and back. This eruption on the forearms was preceded by swelling, and after the complete disappearance of the latter, became very widespread. On the sixth day the swelling of the face rapidly grew worse, and on the eighth day the patient was almost completely unable to see on account of the mechanical closure of the eyelids. No fever had existed, and her general condition was good. There was no headache and no gastric disturbance, but great languor existed.

The urine was alkaline, had a specific gravity of 1010, and was very light-colored, but not voided in excessive quantities. It contained no albumin.

The patient had so far been treated by saline purges. On the eighth day ten grains of calomel and five grains of bicarbonate of sodium were given in one dose. On the following day the swelling had greatly decreased, and after another twenty-four hours the face had entirely changed. The swelling had subsided to a slightly and uniformly raised, indurated, red surface, extending from the eyebrows over the whole of the face, and laterally over the temples and ears. It had sharply-defined, smooth outlines, and at first sight resembled erysipelas.

There was, however, only a little inflammatory redness, no constitutional symptoms, no pain, and no tenderness, but an annoying itching was persistent.

On the tenth day the appearance was that of a papular eczema, showing at some places a tendency to scale. The outlines had lost their sharp contour.

After two weeks the swelling had completely subsided, but some eczema of the face and forearms persisted for four weeks.

The healing of the ulcer was remarkably rapid. The induration which had proved so obstinate was absorbed, healthy granulations started up, and in a week's time the ulcer had completely healed and the surrounding skin was regenerated.

Interesting in this connection is the statement made by the patient, that eight years ago, while treated in a New York hospital for varicose ulcers, a similar train of symptoms, only more severe, occurred after the use of a yellow salve of the same odor as the iodoform ointment used on this occasion. The patient was sick in bed for several weeks, and, to quiet her pain, had to be kept under morphine for several days.

She also states that the appearance of her face, and her sensations were the same at that time, and that the hospital physicians had completely isolated her.

The iodoform ointment used on this occasion was freshly prepared and had been applied on other patients without bad results.

The following case, resembling the last in the cutaneous phenomena, was under the observation of the writer in the German Hospital of Philadelphia, in the fall of 1889, under the care of Dr. John B. Deaver, who has detailed the history in his article on secondary bone-implantation, in THE MEDICAL NEWS of December 28, 1889.

CASE II.—A. H. had for some time suffered from necrosis of the lower third of the femur. The diseased portion was removed, a large cavity resulting, which healed slowly. To hasten the process, implantation of decalcified, prepared bone-chips was practised. During the operation considerable iodoform was used. On the evening of the operation the patient had some fever, a rapid, weak pulse, and delirium characterized by frightful hallucinations. She recognized, however, every person about her. The patient was somewhat hysterical.

There was swelling of the face within twenty-four hours, especially around the eyes, which continued for several days and disappeared with the fever and delirium.

The healing of the wound was in no way unfavorably influenced, and it was always aseptic. Dr. Deaver attributes the phenomena to the influence of the iodoform.

The third case occurred in the person of the writer.

CASE III.—After a hip-joint resection, which, on account of a sponge sewed up in the wound by mistake, left a discharging sinus, a periosteal abscess formed on the left foot, which was laid open to the extent of three inches and packed with iodoform-gauze. The same night the face and hands began to swell and to ache and violent gastric pain set in, with nausea and vomiting, which continued for forty-eight hours. The iodoform-gauze was removed twenty-four hours after the application.

There were intense headache and languor. The swelling of the face and hands, at the end of forty-eight hours, had extended nearly to the elbows, and increased to such an extent that the hands were literally two large, unshapely masses of flesh, and the wrist-joints obliterated. A week subsequently the swelling had subsided.

Iodoform had, after previous operations, been freely used without evil consequences.

CASE IV.—The fourth case, to which I shall only allude, was M. B., a patient in the German Hospital during the winter of 1889-90. The anterior tibial nerve was resected on the dorsum of the foot, on account of neuralgia of the great toe, and an iodoform dressing applied. Acute dermatitis of the whole foot and part of the leg at once developed, with burning and scalding pain, the formation of blebs, and a profuse serous exudation. Later an iodoform dressing was again tried with the same result. No general or other local symptoms were noticed.

The features common to the first three cases are the solid tumefaction of the face, and, in two of them, the implication of both the hands and forearms. The swelling of the face was in all three cases urticaria-like.

The eruption on the arms in the first case was eczematous, and preceded by swelling, while in the third case no eruption appeared with the disappearance of the swelling.

In the literature on the subject the writer has found the following cases:

Urticaria developing on the second day after an application of iodoform powder to a small granulating surface left after a compound fracture of the radius and ulna, is reported by Powell[1] as the first case in his large experience. Wheals covered the face, neck, sternum, and back, and the whole forearm was covered with nodules. The wound healed rapidly.

The cases of acute eczema after the application of iodoform are reported by Fifield[2] and Campbell Pope.[3] The former used a small quantity of iodoform in powder on two successive days on an ecthymatous ulcerated surface of the scalp. Eczema, with a profuse serous discharge, developed on the second day. Two days later the head, face, and neck were enormously swollen, and the eyelids puffed to such a degree as to interfere with vision. There was but little systemic disturbance. The pulse was rapid.

Klomann[4] used from 30 to 40 grains of iodoform

[1] St. Louis Medical and Surgical Journal, vol. lvi., 1889.
[2] Boston Medical and Surgical Journal, March 16, 1882.
[3] Lancet, London, 1889, vol. i. p. 681.
[4] Maryland Medical Journal, 1889, vol. xxi. p. 404.

in powder on a rather extensive leg-ulcer. A few hours afterward acute dermatitis of the whole leg, and bleb-formation, developed with severe scalding and burning pain. The legs swelled, and also the hands, the latter to such a degree as to prevent flexion of the fingers. Constitutional depression was absent.

Barois's case[1] differs from the cases already cited in that an eruption appeared after repeated injections of an ethereal solution of iodoform two months previously. The eruption was urticaria-like, and located, as usual, on the arms, breast, and shoulders.

In addition to these peripheral cutaneous affections, a number of disturbances of the central nervous apparatus have been published, and which may be grouped together.

Most of these observations were made in France and Germany. They included all conditions, from simple active delirium to acute mania; and also mental depression, melancholia, and hypochondriasis, with or without sleepiness and stupor. Fever and gastro-intestinal disorders are either absent or present in variable degrees.

Koenig makes a distinction between a form resembling meningitis and a comatose form. To the former class belong cases of acute mania reported by Langenbeck,[2] of which several are said to have died.

A good example of the second group is the case published by Seeligmüller,[3] in which a moderate quantity of the powder was used on extensive surfaces. In this case the symptoms were, melancholia, hypochondriasis, delirium, with delusions, weakness of memory, cardiac weakness, headache, and somnolence.

Casius's[4] two cases of iodoform-poisoning, resembling meningitis in the cerebral and gastro-intestinal symptoms, but not in the temperature (which was only slightly elevated), partake of the characteristics of both groups, with a predominance of the symptoms of the former. Both cases were tuberculous.

Shere, of Hamburg,[5] describes six classes of cases as follows:

1. High fever, without other phenomena.

2. Fever, with mild gastro-intestinal irritation, depression of spirits, and rapid pulse. Recovery almost invariable.

3. Very rapid, soft pulse, from 150 to 180; no fever; great danger.

4. Very rapid pulse, with high fever; death almost invariable.

5. After severe operations, rapid collapse and death.

6. A form resembling meningitis: somnolence, deepening into stupor; pupils fixed in myosis.

The writer has not seen the original article, and, therefore, does not know what quantities of iodoform were used; but, as the cases occurred during the time of the very free use of iodoform in Germany, he assumes that they were large. Furthermore, it seems not improbable that the severity of the operations tended to produce the fatal result in the cases of Group 5, while the cases in Groups 1 and 4 resemble the condition seen after wound-infection.

A fatal case is reported by Langenstein, due to the use of one drachm,[1] and by Czerny after one and a half drachms.[2] "In the first of these the cause of death seemed doubtful."

Recently, a fatal case of iodoform-poisoning was reported by Barois in the *Archives de Médecine et de Pharmacie Militaires*, No. 8, 1890.[3] In this case the symptoms were mainly cerebral, and the patient died in coma on the ninth day. The iodoform was injected in ethereal solution into a cold abscess beneath the pectoral muscle, nearly a drachm being used.

Barois also gives a review of the reports of forty-two fatal cases. His grouping is similar to that of Koenig.[4]

Of the fatal cases, thirteen occurred after amputation of the breast. The disease necessitating the operation is not mentioned in all cases, but whenever noted it was cancer. The very large percentage of cancerous, tuberculous, or scrofulous individuals among the fatal cases arranged in tabular form, is striking. Of the forty-two cases, such a diathesis or cachexia appears in thirty-seven. The others were as follows:

1. Ovariotomy. (Disease not given.)

2. Removal of the tongue. (Primary disease not mentioned.)

3. Amputation of a leg.

4. Laparotomy. (Myoma uteri.)

5. Vaginal hysterectomy. (Disease not mentioned.)

Langenbeck's[5] experience, as given by him before the Eleventh Surgical Congress, Berlin, 1882, was that he had seen no evil consequences when he used iodoform cautiously. Eckelmann[6] also finds the

[1] Archives de Médecine et de Pharmacie Militaires, No. 8, p. 90.

[2] Synopsis of the official reports of the Surgical Congress, Berlin, 1882, by Louis Bauer; reported in the St. Louis Medical and Surgical Journal, 1882, vol. xliii. p. 235.

[3] Berlin. klin. Wochenschrift, May 8, 1882.

[4] La France Médicale, Nov. 20, 1888.

[5] H. C. Wood: Materia Medica, Therapeutics, and Toxicology.

[1] Wiener med. Woch., 1882, vol. xxxii. p. 105. [2] Ibid.

[3] Reviewed in THE MEDICAL NEWS, vol. lvii. No. 9, p. 485.

[4] Troubles intellectualles qui font panser a la méningite aigue ou aux formes les plus graves de la mélancholie.

[5] Quoted by Bauer in the St. Louis Medical and Surgical Journal, 1882, vol. xliii. p. 235.

[6] Allgem. Zeitschr. f. Psychiatr. xl. p. 258; Neurol. Centralbl., 2, 1883, p. 352.

moderate use of iodoform harmless in the surgery of the insane.

It must further be taken into consideration that psychoses at times develop in immediate consequence of operations. Thus, v. Frankl-Hockwart reports thirty-one cases of psychosis following operations on the eye.[1]

The writer himself has seen a case of acute mania following an oöphorectomy during his residentship in the German Hospital.

It is generally accepted that the liberation of iodine, and the action of the latter on the nervous centres and internal organs, are accountable for the grave phenomena and fatal terminations of iodoform-toxæmia. It is also known that various skin eruptions are one of the symptoms of iodism. The use of iodine internally for some time is necessary to produce them, while one of the most striking features of iodoform-poisoning from dressings is their prompt appearance.

Idiosyncrasy must explain why large amounts are so often borne with immunity, while in comparatively few cases under similar circumstances death is caused by small amounts—as little as 45 grains in Barois's case.

Although, as stated by Barois, danger in poisoning depends in part on the form of application and the locality, yet the same mode of application in the same localities is by no means always followed by the same result. It seems that the cause must be looked for in conditions which favor the decomposition of the iodoform and the formation of albuminate of iodine. De Ruyter (quoted in Dr. H. C. Wood's work on therapeutics, 7th edition, page 540) showed that iodoform is decomposed by blood, serum and other organic fluids in which microörganisms are growing, and apparently proved that the decomposition is produced by the ptomaïnes developed by the growing organisms.

If this be true, the danger of the toxic effects of iodoform-application depends on the presence on absorbing surfaces of an organic fluid, as blood or serum, or of ptomaïnes. Whether these be the outcome of bacteriological life or of direct chemical changes seems indifferent.

From the foregoing facts it would appear that:

1. Iodoform-toxæmia, after external application to wounds or ulcerating surfaces, manifests itself in one or more of the following clinical forms, viz.: lesions of the skin and subcutaneous tissue, gastro-intestinal irritation and disturbances of the nervous system, either psychical, thermal, or cardiac in their manifestations.

2. Very small doses do not lead to grave intoxication, though even the most trifling doses may produce annoying skin symptoms.

3. The uticaria-like eruptions or eczematous or simple dermatitis with profuse serous discharge resemble each other in their distribution.

4. All forms of iodoform-poisoning have the common features of rapid development and slow disappearance.

5. In none of these cases was the repair of the wound impaired, but, on the contrary, in some rapid improvement was striking.

6. Some apparently normal individuals are by idiosyncrasy predisposed to iodoform-toxæmia.

7. The fatal cases so far reported show that tuberculous, scrofulous, or cachectic individuals are most exposed to danger, a fact which is well illustrated by the writer's third case of iodoform-poisoning, which occurred after chronic suppuration, while large quantities of iodoform had been used with immunity before the existence of the latter.

8. These clinical facts seem to harmonize with de Ruyter's experimental results, according to which the danger of iodoform-poisoning depends on the presence of organic fluids and ptomaïnes on absorbing surfaces, under the action of which albuminates of iodine are formed, which are subsequently absorbed.

9. The danger of poisoning also depends in large part upon the form of application, that by ethereal solution having proved most virulent, and also, it seems, upon the locality to which it is applied and the extent of denuded surface.

10. Though iodoform is extensively used in specific inflammations, no case of iodoform-poisoning belonging to this group is reported, and therefore it seems not unlikely that immunity exists in syphilitic individuals.

After this article was completed the writer's attention was called by Dr. H. A. Hare to five cases reported[1] by Charles Audry, of iodoform-poisoning following tamponing of the peritoneum after Mikulicz's method. A considerable amount of iodoform was used in each case. In four cases the symptoms were slight, consisting mainly of elevation of temperature, without local or general signs of infection, gastric irritation, and a peculiar metallic taste (*signe de l'argent de Poncet*). Iodoform was discovered in the saliva in each case. The only fatal case was cachectic. An enormous ovarian cyst was removed. Fatty heart and kidneys are supposed to have existed. Iodoform-gauze was used for tamponing. The patient died from septicæmia and iodoform-toxæmia, the former being the immediate cause of death, but the symptoms of the latter being marked.

This is one more fatal case of iodoform-toxæmia

[1] Jahrbuch für Psychol., ix. p. 15, 182. Referred to in Neurol. Centralbl., March 15, 1890.

[1] Lyon Médical, November 16, 1890.

in a cachectic individual. In favor of the theory based on de Ruyter's experiments is also the presence of considerable exudate in the serous sac. On the other hand, it illustrates the importance of excluding septicæmia as a *causa exitus lethalis*, and also the importance of an examination of the kidneys prior to the application of iodoform. In all cases the symptoms supposed to be due to the iodoform developed promptly.

Audry also found that septic symptoms are most likely to develop after the removal of tampons which were firmly packed and adherent. The explanation given by Sänger is adopted, namely, that in the stretching of the gauze strips, part of their contents are squeezed into the peritoneal cavity.

MEDICAL PROGRESS.

Chronic Bronchitis. — *L'Union Médicale* recommends the following pill for chronic catarrhal bronchitis:

℞.—Turpentine, Tar . . . of each ½ drachm.
Balsam of Peru . . . 1½ drachms.
Benzoate of sodium, a sufficient quantity to make 80 pills.

Two of these pills may be given three times a day, in cases in which there is marked catarrhal exudation into the bronchial tubes.

Treatment of Excessive Sweating.—KAPOSI is said to recommend the following treatment in cases of excessive sweating.

℞.—Powdered tannic acid . . 75 grains.
Alcohol . . . . . 6 grammes.

This is to be made into solution and employed with friction several times a day, in cases of excessive sweating of the axillæ, the skin being afterward covered with pulverized talc. In excessive sweating of the feet it may be useful to employ the powdered talc, powdered starch, or lycopodium with powdered almonds. It is also sometimes useful to resort to washing the parts with alcohol. The patient must be warned not to rub the feet with glycerin or ointments.

Treatment of Senile Pruritus.—In the treatment of senile pruritus BESNIER employs the following solution:

℞.—Carbolic acid . . . . 1 drachm.
Vinegar . . . . . 8 ounces.

This is to be applied as a lotion to the surface which is affected, after having been mixed with from 1 to 2 pints of hot water. Afterward the parts are to be covered with a powder composed as follows:

℞.—Salicylate of bismuth . . . 6 drachms.
Powdered starch . . . 3 ounces.

Or salicylic acid may be employed in place of the salicylate of bismuth, with twice the amount of powdered starch, namely, 6 ounces.

Treatment of Intercostal Neuralgia. — MENARD treats intercostal neuralgia by applying a blister over the painful spot, by painting the part with iodine, or by the use of hot and cold douches. At the same time, if the pain is severe, he administers small doses of opium, or even hypodermics of morphine. Sometimes atropine or chloroform may be needed, and frequently soothing liniments have to be applied. The causes of intercostal neuralgia are numerous, and the condition which provokes the pain must be discovered and removed. If it is due to anæmia, Menard advises a course of baths, accompanied by the use of one of the preparations of iron. On the other hand, if the neuralgia be due to rheumatism, the salicylates, antipyrine, or diaphoresis must be resorted to; and if the case is a chronic one, sulphur, alkaline, or thermal baths should be adopted. Venesection, however, in the majority of cases gives excellent results. In other instances, iodine ointment applied to the walls of the chest, protecting the clothing by means of an adhesive plaster, seems to do great good.

The Treatment of Purpura.—If purpura is accompanied by hæmorrhages, the physician should resort to the use of such drugs as ergot or Monsel's solution. On the other hand, if it depends upon scorbutus, the best treatment is the employment of the juice of lemons or citrons, and the maintenance of a vegetable diet. In those cases which are due to blood-poisoning, the physician should administer tonics and quinine to combat the fever. The nourishment should be liquid, and chiefly composed of milk, thin soups, with a little wine or rum. In cachectic purpura the anæmia is to be cured by the methods usually employed for this purpose. If the disease invades the lower extremities, the patient should be forbidden to walk about, as this tends to an increase in the hæmorrhagic exudate.

Mixture for Catarrhal Jaundice.—

℞.—Powdered rhubarb . . . 7 grains.
Distilled water . . . . 6 ounces.

Make into an infusion, filter, and add bicarbonate of sodium, 2½ drachms, and syrup of peppermint, 5 drachms. Of this, give a dessertspoonful every two hours.

A Mixture for Hæmoptysis.—BAMBERGER employs the following mixture in hæmoptysis:

℞.—Turpentine . . . . 1 drachm.
Oil of sweet almonds . . 1 "
Mucilage of acacia . . . 4 drachms.
Simple syrup . . . . 4 "
Distilled water . . . . 5 ounces.

One teaspoonful of this mixture may be given every half-hour.

Lemonade-wine.—DUJARDIN-BEAUMETZ, in the *Bulletin Général de Thérapeutique*, January, 1891, recommends the following drink in typhoid fever and other febrile states:

℞.—Red wine . . . . . ½ pint.
Tartaric acid . . . . 2 drachms.
Water . . . . . 1½ pints.

Or, if more wine is desired, equal parts of wine and water may be used. For those who prefer a white to a red wine, the white wine may be substituted.

The Treatment of Syphilitic Vegetations of the Genitals.—The following prescription may be employed for the removal of syphilitic condylomata. BOCKART, under the name of "lead-caustic," uses:

℞.—Oxide of lead . . . . . 4 grains.
Saturated solution of caustic potash at 100° . . . . . 2 drachms.
Mix and label, "For external use."

This mixture is to be applied to the vegetations by means of a small glass rod or stick, and immediately after its application a small tampon is to be applied over the spot. After the mixture has been in contact with the vegetation for five minutes, it will be noticed that the mass has the consistency of mucus, and is removed without difficulty. The spot which remains should be treated by a powder of iodoform.

Intra-uterine Antisepsis.—The following prescriptions taken from *La Tribune Médicale* have been collected by COUTURIER from the methods of various gynecologists and obstetricians in France and Germany.

DOLÉRIS uses a mixture composed of

℞.—Creasote . . . . . 20 parts.
Glycerin . . . . . 60 "

BUDIN one of

℞.—Creasote . . . . . 15 parts.
Glycerin . . . . . 50 "

When creasote is not used ROUX and SCHNELL use an emulsion of iodoform made by adding 15 parts of iodoform to 30 parts of glycerin, or in other cases they use the following:

℞.—Iodoform . . . . . 50 parts.
Glycerin . . . . . 40 "
Water . . . . . 10 "
Gum tragacanth . . . . 1 part.

In other instances,

℞.—Iodoform . . . . . 2 parts.
Gum tragacanth . . . . 6 "
Water . . . . . 10 "

PERAIRE uses,

℞.—Powdered iodoform . . . 10 parts.
Gum tragacanth . . . . 1 part.

Glycerin and water, a sufficient quantity to make a suppository.

SPAETH, of Vienna, is said to use suppositories composed of the following materials:

℞.—Powdered iodoform . . . 20 parts.
Gum arabic . . . . . 2 "
Glycerin . . . . . 2 "
Powdered starch . . . . 2 "

The Treatment of Hepatic Colic and Catarrhal Jaundice with Calomel.—ZACHARIINE, Professor of Clinical Therapeutics at Moscow, has published some remarkably favorable results which he has obtained in the treatment of hypertrophic cirrhosis of the liver and grave cases of hepatic colic accompanied by fever by the administration of fractional doses of calomel. The calomel is to be given in the dose of one-half grain every hour until five or six doses have been taken, and after this every two hours until the characteristic purging produced by calomel appears. If the calomel does not act it is necessary to follow it by a saline or a tablespoonful of castor oil. It is also useful for the patient to use frequently a gargle of chlorate of potassium, in order to avoid the appearance of mercurial stomatitis. This gargle should be continued for some days after the calomel has been stopped. The influence of this treatment is said to be felt almost immediately, and causes very considerable amelioration of the symptoms. The pain, the fever, and the dyspeptic symptoms disappear, and the urine in catarrhal jaundice becomes clear. Alkaline mineral waters may now be given with advantage. In one case of peculiarly severe hepatic colic, Zachariine was obliged to administer calomel in this way on ten different occasions in the space of two months before a cure was obtained.

Night-sweats.—The following prescriptions for the relief of night-sweats are published in the *Revue Général de Clinique et de Thérapeutique:*

℞.—Sulphate or tannate of quinine . 15 grains.
Powdered ergot . . . . 30 "

Divide into four powders and take two or three in the course of the day. This prescription is also valuable in cases having a tendency to hæmoptysis.

Or,

℞.—Powdered agaricine . . 1 drachm.

Make into four powders and take one powder at night.

℞.—Powdered agaricine . . 1 drachm.
Powdered belladonna root . 7 grains.

Divide into four powders, take one powder at night.

℞.—Powdered agaricine . . 1 drachm.
Tannin . . . . . 1 "

Make into four powders and take one to two powders a day.

Prescription of Chloralamide.—GALIANA recommends the following prescription when using chloralamide:

℞.—Chloralamide . . . 45 grains.
Dilute hydrochloric acid 5 parts.
Distilled water . . 2 ounces.
Syrup of raspberry . 2½ drachms.

One-half of this amount may be given. This may be divided into four doses, one of which may be given every four hours. For rectal injection he recommends:

℞.—Chloralamide . . . 30 grains.
Dilute hydrochloric acid . 2 drops.
Distilled water . . . 3 ounces.

Or the chloralamide may be dissolved in an infusion of tea to which should be added a considerable quantity of sugar.

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THE MEDICO-LEGAL VALUE OF THE GONOCOCCUS.

SINCE the discovery of the gonococcus, and since its general acceptance by the medical profession as a means of differentiation between specific and non-specific blennorrhœa, hopes have been entertained that it might prove of value in medico-legal cases, especially in those instances of vulvo-vaginitis occurring in children, and often giving rise to suspicions of criminal practice. Neisser, Lober, and Kratter all assert very positively that by the aid of the microscope they can determine without question whether the vaginal discharge is gonorrhœal, dependent upon impure contact, or whether it is non-specific, in which case it may be evoked by any one of a large number of irritants.

VIBERT and BORDAS (*La Médecine Moderne*, November 13, 1890) point out that to be of value in legal medicine the proof must be absolute, and that probabilities are of little avail. The vagina contains, even in health, a vast number of microörganisms. If the secretion of an acute vaginitis occurring in the person of a little girl is examined diplococci presenting all the characteristics of the gonococcus are usually observed.

In those cases examined by the authors the cause of inflammation was purely traumatic, and according to the evidence it was scarcely possible that gonorrhœal pus had come into contact with the mucous membranes. The discharge of these cases contained diplococci resembling in every respect gonococci. From four cases pure cultures of this microörganism were obtained, in the remainder there were other varieties. The diplococci were found always in the interior of the pus-corpuscles, and were very abundant. In form, in dimensions, in position, in grouping, in habitat, and in reaction to staining-fluids, these microörganisms were identical with gonococci.

It is well known that in the Gram method the aniline stain affects all microörganisms likely to be found in blennorrhœal pus excepting the gonococci; hence, when a preparation previously colored is washed for some minutes in Gram's solution and is then dehydrated in alcohol the gonococci are completely decolorized. The diplococci of non-gonorrhœal pus act in the same manner.

Other authors and especially Bumm have asserted that there are microörganisms which cannot be distinguished either morphologically or by staining-methods from the gonococcus.

It would seem from the present evidence that the results of microscopical examination of vulvo-vaginal discharges are not sufficiently conclusive to warrant a positive statement either for or against impure contact.

THE TREATMENT OF CHRONIC PERIMETRITIS AND PARAMETRITIS.

DR. SAVAIL (*Revue Obstétricale et Gynécologique*, September, 1890), in advocating the treatment of chronic perimetritis and parametritis by warm sulphur baths, offers the following theory: Perimetritis, secondary to chronic catarrh and hyperæmia, depends in the beginning on a permanent lesion of the epithelium lining the uterus, tubes, and follicles of the ovaries, which, in its whole extent, is derived from the germinal epithelium, and presents, with the exception that the cilia are absent in the cylindrical epithelium of the follicles, the same general type.

In support of his treatment the writer alludes, first, to the excretion of sulphur by the epithelium of the air-cells, proved by the early demonstrations of Bouchardat, in which the exhalations from patients under sulphur treatment cause the surface of a lead plate to turn black. He then refers to the theory of Bergeon in establishing the beneficial action of sulphur, during its excretion, on the pul-

monary epithelium; and concurs in the opinion of Küss, who, in his experiments on the intestinal absorption of sulphur contained in the bile, demonstrates the importance of this substance in the reconstruction of the epithelium. He attributes to sulphur a double action on the epithelium—antiseptic and reparative: antiseptic—in neutralizing toxic alkaloids of bacterial origin; reparative—in reëstablishing the physiological resistance of the cells; or, in other words, in exerting a *vivifying* influence on the germinating layer of the epithelium. Thus, in chronic perimetritis, the treatment owes its efficiency to the chemical, as well as the thermal, action of the sulphur baths; in parametritis the latter element plays the more important *rôle*, in stimulating, by means of warm baths, the peripheral circulation, and by exciting, by means of warm sulphur douches, the pelvic circulation.

He is particular to place the altered hygienic and climatic conditions of the patients, their physical and moral repose, and the mode of employing the waters under the head of auxiliaries, but it is a question whether in this he does not claim for his method an undue advantage over other baths. However this may be, the cases which he reports speak for the success of the treatment, and the importance of his communication is manifest: First, because he attaches a clinical importance to the primary pathological lesion; and secondly, because he brings to notice the advantages of general treatment in such disorders.

No doubt the advocates of massage would be unwilling to admit that the foundations which they claim for their mode of treatment, namely, stimulation of the pelvic circulation, and restoration to the lymphatics and nerves of the pelvis their proper function, are not claimed with equal justice by the hydropathist.

In our opinion, however, the hydropathic treatment accomplishes the results attributable to massage by milder procedures, and by measures better directed toward the general improvement of the patient, and, therefore, offers the greater advantages.

ABDOMINAL PAIN AS A SYMPTOM OF SLOW HÆMORRHAGE INTO THE PERICARDIUM.

ABDOMINAL pain is certainly not frequently present in cases of slow hæmorrhage into the pericardial cavity, for it is entirely omitted in the accounts of this condition given by most authorities. It is, therefore, interesting to observe that Dr. NAISMITH, of Scotland, has reported four cases of this nature—three in the *Lancet*, July 11, 1885, and the fourth in the *Lancet*, November 9, 1889. In all of these cases the ordinary symptoms of hæmorrhage into the pericardial sac were either absent or quite overshadowed by the abdominal pain.

In the first case, a man of forty-eight years was found lying on the ground much exhausted, and complaining of pain in the region of the abdomen. His statement was that he had felt something give way in his chest. His pulse was feeble, there was a sense of constriction in the chest with slight dyspnœa, but the abdominal pain was so marked (although there seemed to be no disease of the abdomen) that opiates and poultices were used. In six hours he died, rather suddenly. At the post-mortem examination the aorta was found atheromatous, the pericardium was distended with clots and fluid blood, and there was an aneurism as large as a hen's egg of the ascending portion of the aortic arch, which had opened by a small aperture into the pericardium. The heart was pale, flabby, and friable, but its valves were competent, and there was no disease of the abdominal organs found.

In the second case, a man forty-five years old received a blow on the chest. Though complaining of pain in the chest, he was able to walk home, and on arrival seemed about as usual. In an hour he went to bed suffering from pain in his abdomen. A physician applied poultices to the epigastric and umbilical regions, where the pain was most severe. The patient became worse, and died in eight hours. On post-mortem examination no disease was found in the abdomen. The pericardium was distended with clots and blood, and a rupture was found in the wall of the right auricle a fourth of an inch in length, very narrow, and made valvular by a clot. The aorta and heart were somewhat degenerated; the other organs were normal.

In the third case, a man of twenty-five years was found on his back by the roadside, conscious, but extremely weak, and his clothing soaked with blood. There was a knife-cut over the heart an inch in length. He did not think that the wound was fatal, but asked to have his trousers loosened, as he felt great pain in his abdomen. He died while being carried to the hospital, six hours after the injury. At the post-mortem examination the cut was found to have penetrated the pericardium, which was full of clots and blood, and to have passed through the

wall of the left ventricle. All the other organs appeared to be normal.

In the last case, a female laborer forty-eight years of age, who had had occasional attacks of dyspnœa and pain in the chest, became suddenly very ill, with vomiting and severe abdominal pain. When seen by a physician on the following day she was in bed and suffering from agonizing pain in the epigastrium, but not in the heart. This pain had been constant since the onset of her illness. No disturbance of respiration was noticed. In this case also the treatment was directed to supposed disease of the abdomen. She died twenty-six hours after the accident.

At the autopsy the pericardium was found livid and tensely distended with clots and blood. There was an aneurism of the aorta the size of a small egg, which opened by a minute orifice into the pericardium. The aorta was atheromatous; the heart-walls were soft and friable. It was supposed that rupture had occurred several hours before death. No other signs of disease were found.

All these cases occurred in medico-legal practice in Scotland, and are to be accepted as reliable. No attempt was made to minimize the other symptoms, nor does the writer believe that abdominal pain is a constant symptom in such cases.

That the abdominal pain was not caused by coexisting disease is rendered almost certain by its presence in the case of stab-wound, in which the heart and other organs were free from disease.

Dr. Naismith considers the abdominal pain to be a reflex sensation, excited by the pressure and irritation of the hæmorrhage. In pericardial effusion there is no pain, because the pouring out of the liquid is slow, and perhaps because the sensitiveness of the surfaces upon which it is poured is diminished by disease; whereas in hæmorrhage the outpouring is comparatively rapid and the pericardial surfaces are normally sensitive. The irritation, passing up the vagus to the centres in the medulla, is reflected down the vagus to the solar and mesenteric plexuses; or, perhaps, spreads in the medulla to adjacent cells connected with the great splanchnic, and so reaches the solar plexus.

RECENT STUDIES IN LEPROSY.

NEITHER in England nor in America has much been done toward the scientific study of leprosy. In Germany and France, on the contrary, many valuable studies have been made by trained observers and in the leprosy centres of various parts of the world, in Norway, in the Levant, in Palestine, in Africa, China, and the British East and West Indian possessions, medical men placed in favorable positions for study are actively engaged in efforts to ameliorate the conditions of sufferers, and to find palliatives or a cure for the disease if possible.

The papers published by these observers, and their reports made to governments, or to medical societies, are full of interest, and we regret that we can do no more than summarize their results. The literature of leprosy, it must be said, is enormous, and seems to be increasing rapidly.

A recent article by PROFESSOR BOINET, "On Leprosy in Hanoi" (Tonquin), in the *Revue de Médecine*, is a particularly interesting one.

As regards the immediate cause of leprosy, the *bacillus leprœ*, but little new has been discovered. The life-history of this organism remains, as yet, a mystery. This much is known, that it in all probability resists the action of putrefactive material, since it is said to have been found in the earth about the graves of lepers. Although the identity of the bacillus thus found is not beyond dispute, yet the fact of several cases of leprosy having been reported as occurring in those handling or exhuming dead lepers is in favor of the existence of the germ, perhaps in some form as yet unknown in the putrefying cadavers of lepers.

That the bacillus was directly conveyed in these cases seems unlikely, because cases of direct contagion, or inoculation in the ordinary sense of the word, have been only rarely reported, and have never gone entirely undisputed. The greater number of cases of supposed contagion have occurred under circumstances which involved exposure to all other influences, namely, climate, surroundings, and food, which have always been known to favor the occurrence of the disease. But a single case occurs to us in which the fact of direct contagion appears almost indisputable. It is Dr. Hawtrey Benson's case of an Irishman who had never left his native land, and who contracted leprosy after having worn the clothes of his leper brother who had come home from India to die. Very numerous attempts have been made to inoculate leprosy upon animals and also upon men. All but one, we believe, proved futile. The one successful case, that of Keaner, the Sandwich Islander, inoculated by Arning, is not regarded as conclusive by that careful observer, since the man

came of a leprous family himself and was brought up among lepers.

On the other hand, the enormous weight of evidence against direct contagion which has accumulated within the last few years would, before the discovery of the leprosy bacillus, have been regarded as perfectly conclusive against the theory of contagion.

Zambaço, a well-known physician of Constantinople, in a pamphlet published a few years ago, gave a large number of examples tending to show the non-transmissibility of leprosy by direct contagion. In some instances great efforts have been made to convey or to receive the disease. Zambaço reports the case of a handsome young woman of good family, who fell in love with a leper and married him. She lived with him for eight years. Partly through jealousy on his part, and partly through devotion on hers, they made every effort to share the leprosy. The leprous husband caused her to kiss his ulcerated tongue repeatedly and numerous attempts at inoculation were made. Nevertheless, while the husband died of leprosy the widow still survives in good health after some years.

With facts like these confronting them, investigators have been led to the conclusion that leprosy is conveyed in some other manner than by direct contact or inoculation of the bacillus.

The theory of an intermediate host has been put forward with the corollary of a transition form of the parasite. We believe there is no analogy among the vegetable parasites to guide us in this matter, such as we have among the animal parasites, but this view is just now exciting considerable attention. In order to ascertain what facts could be adduced, extensive examinations of food, air, soil, etc., in leprosy districts have been undertaken. As regards fish, which has been always more or less incriminated, this article of food in the salted state has, indeed, been found the habitat of numerous varieties of bacteria, and when putrid doubtless contains many more. But no organisms have, as yet, been found in this article of diet which can be connected with the leprosy bacillus.

A curious relationship between leprosy and tuberculosis has been suggested of late, and the resemblance between the two forms of bacillus, together with the fact that the diseases are often concurrent, lends a certain interest to these views, which will certainly be examined into by those having the opportunity of investigation.

Preventive inoculation, which has been talked of for some time, must receive a new impulse from the results of Koch's discovery. Meanwhile, cases of cure seem to be gradually increasing in number, although no new remedies have been discovered.

Looking at the subject from a general standpoint we may hopefully assert that real progress is being made in the study of leprosy, and that there is good ground to hope for the diminution and even the ultimate extinction of the disease in most parts of the world.

REVIEWS.

A HANDBOOK OF THE DISEASES OF THE EYE AND THEIR TREATMENT. By HENRY R. SWANZY, A.M., M.B., F.R.C.S.I. Third edition, with illustrations. Philadelphia: P. Blakiston, Son & Co., 1890.

The third edition of Mr. Swanzy's excellent treatise shows evidence of having been carefully revised and rearranged. The chapters on diseases of the iris, ciliary body, choroid, and sympathetic ophthalmitis have been incorporated into one chapter under the general heading of "Diseases of the Uveal Tract." This, as the author suggests, is more consonant with their nosology, and will lead the student to a much more thorough and rational grasp of the subject. Other changes have been made, especially in the chapter upon the localization of cerebral disease from a study of the ocular symptoms, which has been enlarged and much improved. The addition of a colored diagram, showing the course of the optic fibres, with the centres for the three visual perceptions of light, form, and color and their relations to the field of vision, is a very commendable feature. In explaining Wernicke's symptom, the hemianopic pupillary inaction of hemianopsia, the author does not name the symptom by any of the terms commonly used. Similar omissions to designate properly symptoms by their well-known names result in needless trouble or mystification of the student. But there are few defects to be pointed out, and, viewing the work as a whole, it may be said that Mr. Swanzy has succeeded in producing the most intellectually conceived and thoroughly executed *résumé* of the science within the limits he has assigned himself. As a "students' handbook," small in size and of moderate price, it can hardly be equalled.

CORRESPONDENCE.

KANSAS CITY.

KANSAS CITY has received two invoices of Koch's lymph—one of five ounces and another of two and a half ounces. It is unfortunate that the recipient of one package is making use of it in an irregular manner and in direct violation of his promise to Professor Koch to use it only in hospitals. Aside from this he has thrown discredit upon the lymph by making a very poor selection upon which to begin the treatment, the patient being almost *in extremis*, and dying in a week after the first injection. The death is not attributable to the

treatment, for the latter was stopped after the third injection because of the absence of any reaction and the very alarming condition of the patient. The autopsy showed a general miliary tuberculosis in addition to a large cavity in one of the lungs. So, while the lymph had nothing whatever to do with the patient's demise, the notoriety given it by the daily press of the city has made patients previously anxious to undergo the treatment very cautious and reluctant.

Dr. E. Von Quast, the recipient of the other invoice, has three patients under treatment, and reports that they seem to be improving.

One of the cases of early phthisis had a reaction temperature of 104° F. from 0.001 of the lymph. Another case, one of tuberculosis of the pharynx, does not experience the general reaction, but the local reaction is very marked, and the case is improving. The cases have been under observation but a week, so, of course, it is too early to speak definitely; but those who are watching them have "great expectations," especially in the case of the man who has tubercular disease of the pharynx.

The tidal wave of knowledge is gradually sweeping westward, and the faculties of the two principal schools here are aroused to the necessity of lengthening their courses; one of them has taken steps already in that direction, and the other will soon follow.

Several meetings have been held recently with a view to establishing a post-graduate school here. Certainly, Kansas City needs a post-graduate school, for the majority of the graduates of our local schools choose this city or the surrounding country as localities in which to practise their profession. The plan does not seem practicable to many, on account of the scarcity of clinical material, and the fact that a post-graduate school without an abundance of clinical material would be a farce.

The very mild epidemic of scarlet fever which prevailed during the past few months is subsiding, and the general health of Kansas City is very good.

The meetings of the Academy of Medicine are growing in interest, and the earnest individual effort which is being put forth by the members is resulting in much better papers and discussions.

METHYL-BLUE IN DIPHTHERIA.

To the Editor of THE MEDICAL NEWS,

SIR: Fifty cases of *well-marked* infantile pharyngeal diphtheritis have been successfully treated by me during the last six months by the local application of a mixture of chemically-pure methyl-blue and powdered sugar, two parts of the former to ninety-eight of the latter, controlling the fever with small doses of acetanilid and sustaining the vital forces with extract of beef, egg and milk. The methyl-blue I employ is entirely tasteless and free from all deleterious effects (Lehr & Fink, 128 William St., New York). The manner in which I use it is as follows: The patient's head is held in a horizontal position, the tongue depressed, and from five to ten grains of the powder are freely applied to the pharynx. This is repeated every two hours, or as often as new crops of exudation make their appearance. Sudden elevation of the head must be prevented, the mouth kept closed to prevent spitting, and no drink or food given for ten or fifteen minutes before and after the application.

Retronasal and laryngeal diphtheritis has in none of the fifty cases above referred to made its appearance. Where the nose or larynx was involved at the beginning I could not claim such good results, owing to the already enfeebled condition and the great difficulty of applying the remedy, still I have done better with it than with any other treatment. Washing the retronasal and nasal space with boiled water and applying the powder with the Devilbiss blower have given me the most satisfaction.

I experienced great difficulty in getting the right blue; it is on that account that I mentioned Messrs. Lehr & Fink, who are agents for this article; at the same time, I believe it to be the same as methylene-blue made by Merck (see Merck's Bulletin, January, 1891).

H. BEYER, M.D.

STAPLETON, STATEN ISLAND, N. Y.

A STRANGE CASE OF POISONING.

To the Editor of THE MEDICAL NEWS,

SIR: I was called in haste on the night of December 29, 1890, to see Mrs. P., a married woman, and her child, aged about seven years. On arriving at the house I found them suffering from some strange form of poisoning. On inquiring as to whether any poisonous substance had been taken, I was told that the mother, thinking she was suffering from amenorrhœa, had prepared a decoction from what she supposed to be the root of wild ginger, or Ascarum canadensis, and had taken a considerable quantity of the liquid. The child had also taken some of it with the hope that it would relieve a "bad cold." The symptom which the mother presented was intense pain in the mouth, throat, stomach, and bowels, which was continuous and burning in character. The face, hands, and the lower third of the forearm had the sensation of a thousand small sharp needles piercing the flesh in every direction, and there was also a great deal of burning pain about the wrists. The strangest symptom of all, however, was the eruption which was present. The skin of the face and all the subcutaneous tissues were much swollen, so that one eye was entirely closed and the other eye nearly so. The eruption resembled erysipelas, for the skin was red, thickly covered with pimples and vesicles, while scattered among these were several blisters of considerable size. The eruption was also present about each knee covering a space as big as a hand, being chiefly confined to the popliteal region. In other portions of the body small pimples dotted the skin, and a few vesicles could be found here and there. I forgot to mention that the hands and fingers were much swollen, sufficiently so to make the fingers stand wide apart.

The constitutional symptoms consisted in frequent rigors, accompanied by a fever of about 101°; the pulse was 122 and weak. There was a good deal of nausea and some vomiting. During the remainder of the attack there were considerable swelling, pain, and heat about the anus, and these symptoms were still more marked at the vulva; the labia majora, the nymphæ, and the vagina were greatly swollen, while the burning sensation caused a constant desire to urinate, although micturition was very difficult and painful.

The little girl's symptoms were identical with those of her mother except in degree, all of them being of a milder type, as she had not partaken so freely of the decoction. Another child, who had taken a very small quantity of the liquid, had the same eruption over its body.

The patients made a good recovery, although convalescence extended over three weeks.

I am altogether ignorant of the effects of wild ginger, except the account given in our different dispensatories, and if any of the readers of THE MEDICAL NEWS can give me any information in regard to the use of wild ginger I shall be glad to hear from them. Is wild ginger poisonous? and if so, would it be likely to produce such characteristic symptoms? The husband of the woman gave me some of the roots, which had been collected last fall. They were from two to four inches long, varied somewhat in size, but averaged about the diameter of rye-straws. They were crooked and knotty, very brittle, and gave a pleasant, aromatic taste when chewed, which closely resembled that of cardamom.

JAMES MITCHELL, M.D.

MADISON, BOONE CO., WEST VIRGINIA.

FOREIGN BODIES IN THE ŒSOPHAGUS AND GASTRO-INTESTINAL TRACT.

To the Editor of THE MEDICAL NEWS,

SIR: The potato treatment, which has been so largely employed for the removal of foreign bodies in the gastro-intestinal tract, can well be substituted, in my experience, by the employment of pieces of orange of sufficient size to cause so much dilatation of the œsophagus when the orange is swallowed as to permit the foreign body to fall into the stomach, or, if the foreign body has already reached the stomach or intestines, to entangle it in the meshes of the pulp and ultimately to cause its expulsion from the bowel. In a case which came under my care in which a carpet-tack had been swallowed and lodged in the œsophagus a large bolus of orange stopped at a point about half way to the stomach and remained there. The tack had evidently fallen point downward, and had caught in a fold of the mucous membrane, the head of the tack acting as a ledge against which the fruit rested, so that it was impossible to dislodge the foreign body. I gave an emetic, with the result of causing the tack to fall into the stomach during the efforts at vomiting. Physicians will be surprised to find how slowly orange-pulp in mass is digested, as I have frequently seen sections of orange which have been swallowed appear in the fæces, three days after ingestion, almost unaltered.

THOMAS HUBBARD, M.D.

TOLEDO, OHIO.

TETANUS.

To the Editor of THE MEDICAL NEWS,

SIR: Having just read an article in THE MEDICAL NEWS of February 7, 1891, upon "A Case of Traumatic Tetanus," it may interest your readers to hear of a case of a similar character which came under my care. During the month of July, 1890, I was called to treat a severe case of idiopathic tetanus occurring in the person of a Scotchman, aged twenty-four years. I administered 20 grains of chloral with 30 grains of bromide of potassium every two hours, keeping the patient constantly asleep with the medicine, only arousing him for the purpose of administering nourishment. Under this treatment the patient made a good recovery.

M. W. SCOTT, M.D.

EMERADO, NORTH DAKOTA.

NEWS ITEMS.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM FEBRUARY 24 TO MARCH 2, 1891.

The following-named officers, having been found by army retiring boards incapacitated for active service, on account of disability incident to the service, are, by direction of the President, retired from active service from this date, under the provisions of section 1251, Revised Statutes: WILLIAM S. TREMAINE, *Major and Surgeon*, LEONARD S. LORING, *Major and Surgeon*.—Par. 19, *S. O. 45, A. G. O., Washington, D C.*, February 27, 1891.

By direction of the Secretary of War, HENRY M. CONN, *Major and Surgeon*, will report in person to the commanding officer, Fort Adams, Rhode Island, for temporary duty at that post, until the arrival of a successor to Samuel M. Horton, Major and Surgeon, when he will return to his proper station.—Par. 8, *S. O. 45, A. G. O., Washington, D. C.*, February 27, 1891.

FREDERICK W. ELBREY, *Captain and Assistant Surgeon*, having been examined by a board of officers, and found physically disqualified for the duties of a surgeon, with the rank of major, by reason of disability incident to the service, is, by direction of the President, retired from active service with the rank of major, under the provisions of the Act of Congress approved October 1, 1870, to date from February 24, 1891, the date from which he would have been promoted, by reason of seniority, if found qualified.—Par. 1, *S. O. 45, A. G. O., Washington, D. C.*, February 27, 1891.

The following-named officers, having been found by army retiring boards incapacitated for active service, on account of disability incident to the service, are, by direction of the President, retired under the provisions of section 1251, Revised Statutes: J. VICTOR DE HANNE, *Captain and Assistant Surgeon*, WILLIAM R. STEINMETZ, *Captain and Assistant Surgeon*.—Par. 18, *S. O. 44, A. G. O., Washington, D. C.*, February 26, 1891.

By direction of the Secretary of War, WILLIAM O. OWENS, JR., *Captain and Assistant Surgeon*, is relieved from further duty in the Department of the Missouri, and will report in person to the commanding officer, Jefferson Barracks, Missouri, for duty at that station, and by letter to the Superintendent of the Recruiting Service.—Par. 2, *S. O. 44, A. G. O., Washington, D. C.*, February 26, 1891.

The following-named officers, having been found by army retiring boards incapacitated for active service on account of disability incident to the service, are, by direction of the President, retired from active service this date, under the provisions of section 1251, Revised Statutes, JOHN DE B. W. GARDINER, *Captain and Assistant Surgeon;* ROBERT W. SHUFELDT, *Captain and Assistant Surgeon*.—Par. 12, *S. O. 43, A.G. O., Washington, D. C.*, February 25, 1891.

BLENCOME E. FRYER, *Lieutenant-Colonel and Assistant Medical Purveyor*, having been found incapacitated by the army retiring board, on account of disability incident to the service, is, by direction of the President, retired from active service, this date, under the provisions of section 1251, Revised Statutes.—Par. 15, *S. O. 42, A. G. O., Washington, D. C.*, February 24, 1891.

By direction of the Secretary of War, the leave of absence granted ALONZO R. CHAPIN, *Captain and Assistant Surgeon*, in S. O. No. 17, January 31, 1891, Department of Dakota, is extended one month.—*S. O. 41, A. G. O.*, February 20, 1891.

THE MEDICAL NEWS *will be pleased to receive early intelligence of local events of general medical interest, or of matters which it is desirable to bring to the notice of the profession.*

Local papers containing reports or news items should be marked.

Letters, whether written for publication or private information, must be authenticated by the names and addresses of their writers—of course not necessarily for publication.

All communications relating to the editorial department of the NEWS *should be addressed to No. 1004 Walnut Street, Philadelphia.*